PAR Perioperative Anesthesia Reports

CASE REPORT

Pediatric Ewing's sarcoma and chronic pain prevention: a case of effective regional anesthesia in knee disarticulation

Luis Alberto Rodriguez Linares[1], Thaylana Saraiva Barroso[1]

How to cite: Linares LAR, Barroso TS. Pediatric Ewing's sarcoma and chronic pain prevention: a case of effective regional anesthesia in knee disarticulation. Periop. Anesth. Rep. 2025;3: e00072025. https://doi.org/10.61724/par.e00072025

ABSTRACT

We present the case of a 5-year-old child with Ewing's sarcoma of the femur undergoing knee disarticulation. Multimodal analgesia was complemented with ultrasound-guided regional anesthesia using femoral and sciatic nerve blocks. This strategy provided excellent perioperative analgesia, minimized opioid consumption, and contributed to the prevention of chronic pain. The case highlights the role of regional anesthesia not only in optimizing immediate postoperative comfort but also in reducing the risk of long-term pain syndromes in pediatric oncologic surgery.

KEYWORDS

Anesthesia, regional; chronic pain; Ewing sarcoma; pediatric anesthesia

INTRODUCTION

Ewing sarcoma is an aggressive malignant bone tumor that predominantly affects children and adolescents, accounting for approximately 10% of all pediatric bone neoplasms, and is second in incidence only to osteosarcoma[1]. Histologically, it is composed of small, round, blue cells and may originate in long bones or soft tissues. Management requires a multimodal approach including systemic chemotherapy, extensive surgery, and, in some cases, radiotherapy, with significant implications for physical function, prognosis, and quality of life[2,3].

Extensive orthopedic oncologic procedures, such as disarticulations or amputations, are often necessary for local disease control. However, these surgeries are associated with severe pain and a high risk of chronic postsurgical pain (CPSP), especially in vulnerable pediatric populations[4]. Recent studies estimate that up to 28% of children develop CPSP following major surgeries, particularly amputations or spinal fusion[5].

Regional anesthesia has gained ground as an effective perioperative pain management tool and a potential preventive strategy against chronic pain. Evidence suggests that well-targeted peripheral nerve blocks, especially when combined with adjuvants like dexamethasone or clonidine, may modulate central sensitization and reduce CPSP incidence[6,7]. In pediatric oncology, however, regional techniques remain underutilized or incomplete, leading to insufficient analgesia.

This case report illustrates such a scenario and highlights the benefits of an optimized regional approach.

CASE REPORT

A 5-year-old boy (15.8 kg) was diagnosed with Ewing sarcoma of the left distal femur. On May 27, 2024, he underwent left knee disarticulation under general

[1]Grupo de Apoio ao Adolescente e a Criança com Câncer – GRAACC, Departamento de Anestesia, São Paulo, SP, Brasil

anesthesia combined with a single-injection ultrasound-guided subgluteal sciatic nerve block. This technique, while effective for the posterior compartment of the knee and distal limb, failed to cover the anterior and medial aspects innervated by the saphenous branch of the femoral nerve. A perineural catheter was placed for continuous analgesia via the sciatic distribution.

Within hours postoperatively, the patient displayed signs of intense distress, with FLACC scores consistently ranging from 7 to 10. Pain was confined to the anteromedial region of the residual limb, accompanied by episodes of allodynia and spontaneous dysesthesias—suggestive of acute neuropathic pain and early phantom limb phenomena. Standard pharmacological treatment with IV morphine (0.05 mg/kg q4h), gabapentin (5 mg/kg q8h), and amitriptyline (25 mg/day) was initiated but proved insufficient. Boluses of 1% lidocaine (4 mL perineural and 1 mg/kg IV) were initiated within the first 24 hours of the postoperative period but proved insufficient.

The perineural catheter was accidentally dislodged after 24 hours during an episode of agitation. Cumulative morphine consumption reached 20 mg in 24 hours (~0.3 mg/kg/day).

At discharge, home analgesia consisted of dipyrone, paracetamol, and gabapentin for five days. Pain remained only partially controlled, with persistent signs of neuropathic discomfort, limb hyperalgesia, and disturbing phantom limb sensations interfering with sleep and ambulation. Two months later, on July 2, 2024, the patient required surgical debridement due to a superficial wound infection. Preoperative FLACC scores remained elevated (4–6), and phantom limb sensations were still reported, though attenuated. No opioids or adjuvant medications were in use at that time.

For the second procedure, anesthesia included general inhalational induction and optimized regional blockade with dual ultrasound-guided sciatic and femoral nerve blocks. A total of 25 mL of 0.2% ropivacaine was administered (15 mL sciatic, 10 mL femoral), combined with 15 mcg clonidine and 4 mg dexamethasone. Postoperatively, pain control was dramatically improved. The patient required only two doses of analgesics on day one, none on day two, and a single dose of dipyrone on day three. FLACC scores dropped to ≤ 2 throughout the recovery period, as shown in Figure 1. Notably, phantom limb sensations were no longer reported after the second surgery and remained absent during outpatient follow-up. The analgesic interventions and corresponding FLACC scores across both procedures are summarized in Table 1. This case illustrates the limitations of incomplete regional techniques and highlights the potential of comprehensive, multimodal regional anesthesia to not only relieve acute postoperative pain but also interrupt the trajectory toward chronic neuropathic and phantom limb pain in pediatric amputation patients.

DISCUSSION

Pain management in pediatric patients undergoing major oncologic limb surgery is particularly challenging due to anatomical, developmental, and psychological factors. In this case, a single sciatic nerve block, though technically adequate for the posterior compartment, failed to provide complete coverage for anterior and medial innervation of the knee—areas supplied by the saphenous nerve. As a result, the child developed severe neuropathic pain and early signs of phantom limb pain (PLP), despite the use of systemic opioids and adjuvant medications. This is consistent with previous literature showing that incomplete regional coverage increases the risk of poorly controlled acute pain and central sensitization[8,9].

Recent studies emphasize that comprehensive peripheral nerve blocks, especially when combining femoral and sciatic

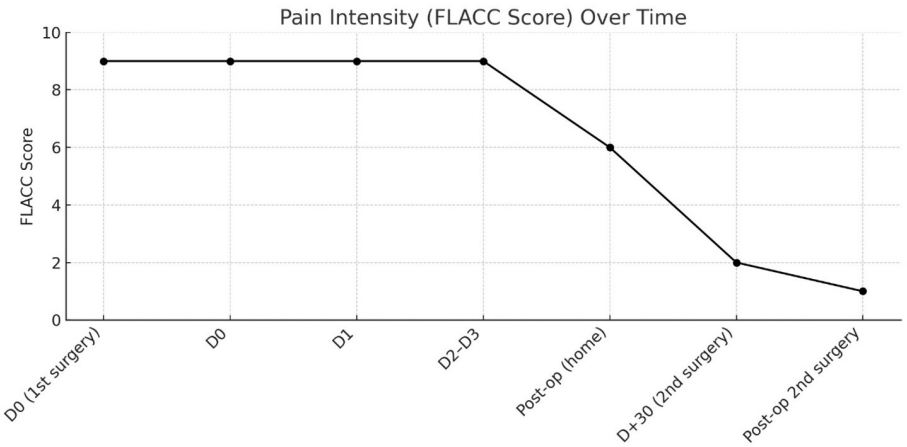

Figure 1. Trend in FLACC pain scores over the perioperative course, showing significant reduction following optimized regional anesthesia.

Table 1. Analgesic Interventions and FLACC Scores

Day	Intervention	Drug/Dose	Route	Remarks	FLACC Score
D0 (1st surgery)	Sciatic block (subgluteal)	Perineural catheter	Ultrasound-guided	No coverage of anterior knee area	9
D0	Morphine 0.05 mg/kg every 4h	~0.3 mg/kg/day	IV	Ineffective	9
D0	Gabapentin 5 mg/kg every 8h	5 mg/kg	Oral	Ineffective	9
D0	Amitriptyline 25 mg/day	25 mg/day	Oral	Ineffective	9
D1	Lidocaine boluses	4 mL 1% perineural + 1 mg/kg IV	Catheter / IV	No significant relief	9
D2–D3	Catheter removal	—	—	Accidental	9
Post-op (home)	Dipyrone + Acetaminophen	15 mg/kg	Oral	Partial analgesia	6
D+30 (2nd surgery)	Sciatic + femoral nerve blocks	Ropivacaine 0.2% + clonidine + dexamethasone	Ultrasound-guided	Excellent response	2
Post-op day 3	Dipyrone (as needed)	1 dose on POD 3	Oral	FLACC < 3	1

components, are more effective in limb amputation or disarticulation surgeries in pediatric patients[10]. Moreover, the addition of adjuvants such as dexamethasone and clonidine has been shown to prolong analgesia, reduce opioid requirements, and possibly attenuate the onset of PLP and chronic postsurgical pain (CPSP)[11,12].

While our patient did not yet meet the time criteria for a CPSP diagnosis at the second surgery, his symptoms aligned with high-risk trajectories. A large-scale review by Rosenbloom et al. (2022) estimates the incidence of CPSP in children undergoing major surgery at ~28%, especially in amputations[13]. This underlines the urgency of implementing preventive analgesic strategies[14].

Furthermore, growing evidence supports the preventive rather than solely preemptive use of regional anesthesia to modulate central sensitization pathways. Preventive analgesia, as defined in recent consensus recommendations, refers to interventions that provide sustained pain control beyond the intraoperative period, thereby reducing chronic pain development. ([15-16]). In this context, the dramatic resolution of phantom pain and improved recovery observed after optimized femoral–sciatic blockade in our patient illustrates the potential of regional anesthesia to not only manage acute pain but also to modify the long-term pain trajectory. Our findings align with recent pediatric and adult studies advocating for early, multimodal regional strategies in high-risk surgical populations. Despite efforts to maintain comparable perioperative pain levels across patients, we recognize that in the case of amputation followed by reoperation due to infection there was a greater intensity of surgical trauma and risk of central sensitization. This may have contributed to the development of phantom limb syndrome, posing a significant limitation for interpreting the results.

CONCLUSION

This case highlights the critical role of comprehensive regional anesthesia in pediatric oncologic limb surgery. Inadequate peripheral nerve blockade contributed to severe postoperative pain and early phantom limb phenomena, while optimized dual nerve blocks with adjuvants provided effective analgesia and resolution of neuropathic symptoms. These findings support the growing body of evidence that regional anesthesia—when appropriately planned and executed—can not only improve acute pain control but also reduce the risk of chronic postsurgical pain in children. Pediatric anesthesiologists should consider multimodal, anatomically complete, and preventive regional strategies as standard practice in high-risk oncologic procedures.

REFERENCES

1. Gaspar N, Hawkins DS, Dirksen U, et al. Ewing sarcoma: current management and future approaches through

collaboration. J Clin Oncol. 2015;33(27):3036-46. https://doi.org/10.1200/JCO.2014.59.5256. PMid:26304893.

2. Karski EE, Matthay KK, Neuhaus J, Goldsby RE, Dubois SG. Characteristics and outcomes of patients with Ewing sarcoma over 40 years of age at diagnosis. Cancer Epidemiol. 2013;37(1):29-33. https://doi.org/10.1016/j.canep.2012.08.006. PMid:22959474.
3. Ladenstein R, Pötschger U, Le Deley MC, et al. Primary disseminated multifocal Ewing sarcoma: results of the Euro-EWING 99 trial. J Clin Oncol. 2010;28(20):3284-91. https://doi.org/10.1200/JCO.2009.22.9864. PMid:20547982.
4. Friedrich P, Rodriguez-Galindo C, Alcasabas P, et al. Global pediatric oncology: current status and challenges. J Clin Oncol. 2017;35(36):4091-6.
5. Rosenbloom BN, Kehlet H, Katz J. Predicting and preventing chronic postsurgical pain: a narrative review. Anesthesiology. 2022;137(2):288-309.
6. Poonai N, Bhatt M, Ali S, et al. Regional anesthesia for pain management in pediatric patients with long-bone fractures: a systematic review. CMAJ Open. 2020;8(3):E585-94.
7. Gurnaney H, Ganesh A, Cucchiaro G. Role of regional anesthesia in the prevention of chronic postsurgical pain in children. Curr Opin Anaesthesiol. 2014;27(5):512-7.
8. Kuo CP, Jao SW, Chen KM, et al. Prevention of phantom limb pain with perioperative epidural analgesia. Pain. 2021;162(1):66-75.
9. Nikolajsen L, Ilkjaer S, Krøner K, Christensen JH, Jensen TS. The influence of preamputation pain on postamputation stump and phantom pain. Pain. 1997;72(3):393-405. https://doi.org/10.1016/S0304-3959(97)00061-4. PMid:9313280.
10. Gurnaney H, Maxwell LG, Kraemer FW, et al. Femoral and sciatic blocks in children undergoing lower extremity surgery: a retrospective study. Anesth Analg. 2021;132(2):435-42.
11. Dadure C, Bringuier S, Raux O, et al. Continuous peripheral nerve blocks in children: a prospective multicenter study of feasibility and incidence of adverse events. Anesthesiology. 2020;132(4):754-65.
12. Albrecht E, Vorobeichik L, Jacot-Guillarmod A, et al. Dexamethasone is effective as an adjuvant for peripheral nerve blocks: a meta-analysis. Anesth Analg. 2022;134(3):495-506.
13. Rosenbloom BN, Kehlet H, Katz J. Predicting and preventing chronic postsurgical pain: a narrative review. Anesthesiology. 2022;137(2):288-309.
14. Lavand'homme P. The prevention of chronic postoperative pain: a narrative review. Anaesthesia. 2023;78(1):76-84.
15. Jones T, Lauder G. Pediatric regional anesthesia and the prevention of chronic pain: the potential for long-term benefit. Paediatr Anaesth. 2021;31(3):239-47.
16. Baarslag MA, van Dijk M, Tibboel D, et al. Regional anesthesia in children: towards evidence-based indication. Curr Opin Anaesthesiol. 2020;33(3):348-55.

This study was carried out at the Hospital do Grupo de Apoio ao Adolescente e a Criança com Câncer – GRAACC, São Paulo, São Paulo, Brasil.

Authors' contributions: Conceptualization: LARL. Methodology: LARL, TSB. Formal analysis: LARL. Investigation: LARL, TSB. Writing—original draft: LARL. Writing—review & editing: LARL, TSB. Supervision: LARL. Project administration: LARL, TSB.

Ethics statement: None.

Conflict of interest: None.

Financial support: None.

Submitted on: March 26th, 2025
Accepted on: October 17th, 2025

Correspondence
Luis Alberto Rodriguez Linares
Grupo de Apoio ao Adolescente e a Criança com Câncer – GRAACC, Departamento de Anestesia
Rua Pedro de Toledo, 572, Vila Clementino, CEP 04039-001, São Paulo, SP, Brasil
Luisro0729@hotmail.com