

Sudhakar Subramani ve Sangini Punia

Çeviri: Dr. Kasım İlker İTAL

3.1 Giriş

Alt ekstremitte cerrahi kolaylaştırmanın yanısıra postoperatif analjeziyi sağlamak için zamanla birçok alt ekstremitte blok teknikleri tanımlanmıştır. Alt ekstremitte sinir blokları, ekstremitte amputasyonu gereken hastalarda kronik ağrı gelişiminin önlenmesinde önemli bir rol oynayabilir [1]. Bununla beraber, alt ekstremitte için rejyonal anestezi son derece güvenli olup, iyi tasarlanmış multimodal anestezi tekniğinin bir parçası olarak kullanıldığında daha iyi bir ağrı kontrolü sağladığı kanıtlanmıştır [2]. Kaynakların kısıtlı olduğu ortamlarda ve birden fazla ciddi komorbiditesi olan karmaşık hastalarda rejyonal anestezi teknikleri, endotrakeal entübasyonun komplikasyonlarını ve genel anestezinin kardiyak depresan etkilerini azaltmaya/ortadan kaldırmaya yardımcı olabilir. Bu bölümde alt ekstremitte anatomisini ve inervasyonunu takiben proksimalden distale doğru sık kullanılan alt ekstremitte sinir bloklarını tartışacağız (Tablo 3.1).

3.2 Alt Ekstremitte Anatomisi ve İnervasyonu

Alt ekstremitenin anterioru lomber pleksus tarafından ve posterioru başlıca sakral pleksus tarafından inerve edilir. Alt ekstremitedeki sinir bloklarının daha iyi anlaşılmasını kolaylaştırmak için belirgin sinirleri kısaca tanımlayacağız.

Kaynaklar

1. Borghi B, D'Addabbo M, White PF, Gallerani P, Toccaceli L, Raffaelli W, et al. The use of prolonged peripheral neural blockade after lower extremity amputation: the effect on symptoms associated with phantom limb syndrome. *Anesth Analg*. 2010;111(5):1308–15.
2. Brull R, McCartney CJ, Chan VW, El-Beheiry H. Neurological complications after regional anesthesia: contemporary estimates of risk. *Anesth Analg*. 2007;104(4):965–74.
3. Koh M, Markovich B. Anatomy, abdomen and pelvis, obturator nerve. [Updated 2019 Dec 11]. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2020. <https://www.ncbi.nlm.nih.gov/books/NBK551640/>.
4. Giuffre BA, Jeanmonod R. Anatomy, sciatic nerve. [Updated 2020 Apr 23]. In: StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; 2020. <https://www.ncbi.nlm.nih.gov/books/NBK482431/>.
5. Sabnis AS. Anatomical variations of sciatic nerve bifurcation in human cadavers. *J Clin Res Lett*. 2012;3(2):46–8.
6. Walji AH, Tsui BCH. Clinical anatomy of the sacral plexus. In: Tsui B, Suresh S, editors. *Pediatric atlas of ultrasound- and nerve stimulation-guided regional anesthesia*. New York, NY: Springer; 2016.
7. Touray ST, de Leeuw MA, Zuurmond WW, Perez RS. Psoas compartment block for lower extremity surgery: a meta-analysis. *Br J Anaesth*. 2008;101:750–60.
8. Morimoto M, Kim JT, Popovic J, Jain S, Bekker A. Ultrasound-guided lumbar plexus block for open reduction and internal fixation of hip fracture. *Pain Pract*. 2006;6(2):124–6.
9. Klein SM, D'Ercole F, Greengrass RA, Warner DS. Enoxaparin associated with psoas hematoma and lumbar plexopathy after lumbar plexus block. *Anesthesiology*. 1997;87:1576–9.
10. Weller RS, Gerancher JC, Crews JC, Wade KL. Extensive retroperitoneal hematoma without neurologic deficit in two patients who underwent lumbar plexus block and were later anticoagulated. *Anesthesiology*. 2003;98(2):581–5.
11. de Visme V, Picart F, Le Jouan R, Legrand A, Savry C, Morin V. Combined lumbar and sacral plexus block compared with plain bupivacaine spinal anesthesia for hip fractures in the elderly. *Reg Anesth Pain Med*. 2000;25:158–62.
12. Ilfeld BM, Ball ST, Gearen PF, Le LT, Mariano ER, Vandenborne K, et al. Ambulatory continuous posterior lumbar plexus nerve blocks after hip arthroplasty: a dual-center, randomized, triple-masked, placebo-controlled trial. *Anesthesiology*. 2008;109(3):491–501.
13. Amiri HR, Safari S, Makarem J, Rahimi M, Jahanshahi B. Comparison of combined femoral nerve block and spinal anesthesia with lumbar plexus block for postoperative analgesia in intertrochanteric fracture surgery. *Anesth Pain Med*. 2012;2(1):32–5.
14. Nie H, Yang YX, Wang Y, Liu Y, Zhao B, Luan B. Effects of continuous fascia iliaca compartment blocks for postoperative analgesia in patients with hip fracture. *Pain Res Manag*. 2015;20(4):210–2.
15. Newman B, McCarthy L, Thomas PW, May P, Layzell M, Horn K. A comparison of pre-operative nerve stimulator-guided femoral nerve block and fascia iliaca compartment block in patients with a femoral neck fracture. *Anaesthesia*. 2013;68(9):899–903.
16. Jæger P, Zaric D, Fomsgaard JS, Hilsted KL, Bjerregaard J, Gyrn J, et al. Adductor canal block versus femoral nerve block for analgesia after total knee arthroplasty: a randomized, double-blind study. *Reg Anesth Pain Med*. 2013;38(6):526–32.
17. Szdcs S, Morau D, Sultan SF, Iohom G, Shorten G. A comparison of three techniques (local anesthetic deposited circumferential to vs. above vs. below the nerve) for ultrasound guided femoral nerve block. *BMC Anesthesiol*. 2014;14:6.
18. Turbitt LR, McHardy PG, Casanova M, Shapiro J, Li L, Choi S. Analysis of inpatient falls after total knee arthroplasty in patients with continuous femoral nerve block. *Anesth Analg*. 2018;127(1):224–7.

19. Grevstad U, Mathiesen O, Valentiner LS, Jaeger P, Hilsted KL, Dahl JB. Effect of adductor canal block versus femoral nerve block on quadriceps strength, mobilization, and pain after total knee arthroplasty: a randomized, blinded study. *Reg Anesth Pain Med.* 2015;40:3–10.
20. Morey TE, Giannoni J, Duncan E, Scarborough MT, Enneking FK. Nerve sheath catheter analgesia after amputation. *Clin Orthop Relat Res.* 2002;397:281–9.
21. Aylinga OG, Montbriandb J, Jiang S, Ladak S, Love L, Eisenberg N, et al. Continuous regional anaesthesia provides effective pain management and reduces opioid requirement following major lower limb amputation. *Eur J Vasc Endovasc Surg.* 2014;48(5):559–64.
22. Williams PL, Bannister LH. *Gray's anatomy: the anatomical basis of medicine and surgery.* 38th ed. New York: Churchill Livingstone; 1995.
23. Benzon HT, Sharma S, Calimaran A. Comparison of the different approaches to saphenous nerve block. *Anesthesiology.* 2005;102:633–8.
24. Roamnes GJ, editor. *Cunningham's Textbook of anatomy.* 12th ed. New York: Oxford Medical Publications; 1981.
25. van der Wal M, Lang SA, Yip RW. Transsartorial approach for saphenous nerve block. *Can J Anaesth.* 1993;40:542–6.
26. Manickam B, Perlas A, Duggan E, Brull R, Chan VW, Ramlogan R. Feasibility and efficacy of ultrasound-guided block of the saphenous nerve in the adductor canal. *Reg Anesth Pain Med.* 2009;34:578–80.
27. Head SJ, Leung RC, Hackman GP, Seib R, Rondi K, Schwarz SK. Ultrasound-guided saphenous nerve block – Within versus distal to the adductor canal: a proof-of-principle randomized trial. *Can J Anaesth.* 2015;62:37–44.
28. Tsai PB, Karnwal A, Kakazu C, Tokhner V, Julka IS. Efficacy of an ultrasound-guided subsartorial approach to saphenous nerve block: a case series. *Can J Anaesth.* 2010;57:683–8.
29. Sahin L, Eken ML, Isik M, Cavus O. Comparison of infracondylar versus subsartorial approach to saphenous nerve block: a randomized controlled study. *Anaesthesiology.* 2017;11(3):287–92.
30. Sztain JF, Khatibi B, Monahan AM, Said ET, Abramson WB, Gabriel RA, et al. Proximal versus distal continuous adductor canal blocks: does varying perineural catheter location influence analgesia? A randomized, subject-masked, controlled clinical trial. *Anesth Analg.* 2018;127(1):240–6.
31. Kwofie MK, Shastri UD, Gadsden JC, Sinha SK, Abrams JH, Xu D, et al. The effects of ultrasound-guided adductor canal block versus femoral nerve block on quadriceps strength and fall risk: a blinded, randomized trial of volunteers. *Reg Anesth Pain Med.* 2013;38:321–5.
32. Davis JJ, Bond TS, Swenson JD. Adductor canal block: more than just the saphenous nerve? *Reg Anesth Pain Med.* 2009;34:618–9.
33. Abdallah FW, Whelan DB, Chan VW, Prasad GA, Endersby RV, Theodoropolous J, et al. Adductor canal block provides noninferior analgesia and superior quadriceps strength compared with femoral nerve block in anterior cruciate ligament reconstruction. *Anesthesiology.* 2016;124:1053–64.
34. Zhang Z, Wang Y, Liu Y. Effectiveness of continuous adductor canal block versus continuous femoral nerve block in patients with total knee arthroplasty: a PRISMA guided systematic review and meta-analysis. *Medicine (Baltimore).* 2019;98(48):e18056.
35. Kuang MJ, Ma JX, Fu L, He WW, Zhao J, Ma XL. Is adductor canal block better than femoral nerve block in primary total knee arthroplasty? A GRADE analysis of the evidence through a systematic review and meta-analysis. *J Arthroplasty.* 2017;32(10):3238–48.
36. Leung P, Dickerson DM, Denduluri SK, Mohammed MK, Lu M, Anitescu M, Luu HH. Postoperative continuous adductor canal block for total knee arthroplasty improves pain and functional recovery: a randomized controlled clinical trial. *J Clin Anesth.* 2018;49:46–52.
37. Kayupov E, Okroj K, Young AC, Moric M, Luchetti TJ, Zisman G, et al. Continuous adductor canal blocks provide superior ambulation and pain control compared to epidural analgesia for primary knee arthroplasty: a randomized, controlled trial. *J Arthroplasty.* 2018;33(4):1040–4.

38. Chen J, Lesser JB, Hadzic A, Reiss W, Resta-Flarer F. Adductor canal block can result in motor block of the quadriceps muscle. *Reg Anesth Pain Med.* 2014;39:170-1.
39. Wiesmann T, Piechowiak K, Duderstadt S, Haupt D, Schmitt J, Eschbach D, et al. Continuous adductor canal block versus continuous femoral nerve block after total knee arthroplasty for mobilisation capability and pain treatment: a randomised and blinded clinical trial. *Arch Orthop Trauma Surg.* 2016;136(3):397-406.
40. Moore KL, Dalley AF, Agur AMR. Clinically oriented anatomy. 7th ed. Lippincott Williams & Wilkins: Baltimore, MD; 2014.
41. Labat G. Regional anesthesia: its technique and clinical applications. 2nd ed. Philadelphia, PA: WB Saunders; 1928. p. 45.
42. Beck GP. Anterior approach to sciatic nerve block. *Anesthesiology.* 1963;24:222-4.
43. Raj PP, Parks RI, Watson TD, Jenkins MT. A new single-position supine approach to sciatic-femoral nerve block. *Anesth Analg.* 1975;54:489-93.
44. Chan VW, Nova H, Abbas S, McCartney CJL, Perlas A, Xu DQ. Ultrasound examination and localization of the sciatic nerve: a volunteer study. *Anesthesiology.* 2006;104:309-14.
45. Graif M, Seton A, Nerubai J, Horoszowski H, Itzhak Y. Sciatic nerve: sonographic evaluation and anatomic-pathologic considerations. *Radiology.* 1991;181:405-8.
46. di Benedetto P, Casati A, Bertini L, Fanelli G. Posterior subgluteal approach to block the sciatic nerve: description of the technique and initial clinical experiences. *Eur J Anaesthesiol.* 2002;19:682-6.
47. Hadzic A, Vloka JD. Anterior approach to sciatic nerve block. In: Hadzic A, Vloka J, editors. *Peripheral nerve blocks.* New York, NY: McGraw-Hill; 2004.
48. Taboada M, Rodríguez J, Valiño C, Vazquez M, Laya A, Garea M, et al. A prospective, randomized comparison between the popliteal and subgluteal approaches for continuous sciatic nerve block with stimulating catheters. *Anesth Analg.* 2006 Jul;103(1):244-7.
49. di Benedetto P, Casati A, Bertini L. Continuous subgluteal sciatic nerve block after orthopedic foot and ankle surgery: comparison of two infusion techniques. *Reg Anesth Pain Med.* 2002;27(2):168-72.
50. Young DS, Cota A, Chaytor R. Continuous infragluteal sciatic nerve block for postoperative pain control after total ankle arthroplasty. *Foot Ankle Spec.* 2014;7(4):271-6.
51. Taboada M, Alvarez J, Cortés J, Rodríguez J, Rabanal S, Gude F, et al. The effects of three different approaches on the onset time of sciatic nerve blocks with 0.75% ropivacaine. *Anesth Analg.* 2004;98(1):242-7.
52. Yektaş A, Balkan B. Comparison of sciatic nerve block quality achieved using the anterior and posterior approaches: a randomised trial. *BMC Anesthesiol.* 2019;19:225.
53. Tammam TF. Ultrasound-guided sciatic nerve block: a comparison between four different infragluteal probe and needle alignment approaches. *J Anesth.* 2014;28:532-7.
54. Cao X, Zhao X, Xu J, Liu Z, Li Q. Ultrasound-guided technology versus neurostimulation for sciatic nerve block: a meta-analysis. *Int J Clin Exp Med.* 2015;8(1):273-80.
55. Danelli G, Ghisi D, Fanelli A, Ortu A, Moschini E, Berti M, et al. The effects of ultrasound guidance and neurostimulation the minimum effective anesthetic volume of mepivacaine 1.5% required to block the sciatic nerve using the subgluteal approach. *Anesth Analg.* 2009;109:1674-8.
56. Tantry TP, Kadam D, Shetty P, Bhandary S. Combined femoral and sciatic nerve blocks for lower limb anaesthesia in anticoagulated patients with severe cardiac valvular lesions. *Indian J Anaesth.* 2010;54(3):235-8.
57. Li J, Deng X, Jiang T. Combined femoral and sciatic nerve block versus femoral and local infiltration anesthesia for pain control after total knee arthroplasty: a meta-analysis of randomized controlled trials. *J Orthop Surg Res.* 2016;11:158.
58. Ota J, Sakura S, Hara K, Saito Y. Ultrasound-guided anterior approach to sciatic nerve block: a comparison with the posterior approach. *Anesth Analg.* 2009;108:660-5.

59. Barbero C, Fuzier R, Samii K. Anterior approach to the sciatic nerve block: adaptation to the patient's height. *Anesth Analg*. 2004;98:1785–8.
60. Singelyn FJ, Aye F, Gouverneur JM. Continuous popliteal sciatic nerve block: an original technique to provide postoperative analgesia after foot surgery. *Anesth Analg*. 1997;84:383–6.
61. Perlas A, Brull R, Chan VW, McCartney CJ, Nuica A, Abbas S. Ultrasound guidance improves the success of sciatic nerve block at the popliteal fossa. *Reg Anesth Pain Med*. 2008;33:259–65.
62. Danelli G, Fanelli A, Ghisi D, Moschini E, Rossi M, Ortu A, et al. Ultrasound vs nerve stimulation multiple injection technique for posterior popliteal sciatic nerve block. *Anaesthesia*. 2009;64:638–42.
63. Brull R, Macfarlane AJ, Parrington SJ, Koshkin A, Chan VW. Is circumferential injection advantageous for ultrasound-guided popliteal sciatic nerve block?: A proof-of-concept study. *Reg Anesth Pain Med*. 2011;36:266–70.
64. Buys MJ, Arndt CD, Vagh F, Hoard A, Gerstein N. Ultrasound-guided sciatic nerve block in the popliteal fossa using a lateral approach: onset time comparing separate tibial and common peroneal nerve injections versus injecting proximal to the bifurcation. *Anesth Analg*. 2010;110:635–7.
65. Prasad A, Perlas A, Ramlogan R, Brull R, Chan V. Ultrasound-guided popliteal block distal to sciatic nerve bifurcation shortens onset time: a prospective randomized double-blind study. *Reg Anesth Pain Med*. 2010;35:267–71.
66. Benzon HT, Kim C, Benzon HP, Silverstein ME, Jericho B, Prillaman K, et al. Correlation between evoked motor response of the sciatic nerve and sensory blockade. *Anesthesiology*. 1997;87:547–52.
67. Vloka JD, Hadzic A, April E, Thys DM. Division of the sciatic nerve in the popliteal fossa and its possible implications in the popliteal nerve blockade. *Anesth Analg*. 2001;92:215–7.
68. Monahan AM, Madison SJ, Loland VJ, Sztain JF, Bishop ML, Sandhu NS, et al. Continuous popliteal sciatic blocks: does varying perineural catheter location relative to the sciatic bifurcation influence block effects? A dual-center, randomized, subject-masked, controlled clinical trial. *Anesth Analg*. 2016;122(5):1689–95.
69. Lam NCK, Petersen TR, Gerstein NS, Yen T, Starr B, Mariano ER. A randomized clinical trial comparing the effectiveness of ultrasound guidance versus nerve stimulation for lateral popliteal-sciatic nerve blocks in obese patients. *J Ultrasound Med*. 2014;33(6):1057–63.
70. van Geffen GJ, van den Broek E, Braak GJ, Giele JL, Gielen MJ, Scheffer GJ. A prospective randomised controlled trial of ultrasound guided versus nerve stimulation guided distal sciatic nerve block at the popliteal fossa. *Anaesth Intensive Care*. 2009;37:32–7.
71. Ma HH, Chou TFA, Tsai SW, Chen CF, Wu PK, Chen WM. The efficacy and safety of continuous versus single-injection popliteal sciatic nerve block in outpatient foot and ankle surgery: a systematic review and meta-analysis. *BMC Musculoskelet Disord*. 2019;20(1):441.
72. Kerr DR, Kohan L. Local infiltration analgesia: a technique for the control of acute postoperative pain following knee and hip surgery: a case study of 325 patients. *Acta Orthop*. 2008;79:174–83.
73. Sankineani SR, Reddy ARC, Eachempati KK, Jangale A, Gurava Reddy AV. Comparison of adductor canal block and IPACK block (interspace between the popliteal artery and the capsule of the posterior knee) with adductor canal block alone after total knee arthroplasty: a prospective control trial on pain and knee function in immediate postoperative period. *Eur J Orthop Surg Traumatol*. 2018;28:1391–5.
74. Soares LG, Brull R, Chan VW. Teaching an old block a new trick: ultrasound-guided posterior tibial nerve block. *Acta Anaesthesiol Scand*. 2008;52:446–7.
75. Redborg KE, Sites BD, Chinn CD, Gallagher JD, Ball PA, Antonakakis JG, et al. Ultrasound improves the success rate of a sural nerve block at the ankle. *Reg Anesth Pain Med*. 2009;34:24–8.
76. Doty R Jr, Sukhani R, Kendall MC, Yaghmour E, Nader A, Brodskaja A, Kataria TC, McCarthy R. Evaluation of a proximal block site and the use of nerve-stimulator-guided needle placement for posterior tibial nerve block. *Anesth Analg*. 2006;103:1300–5.