Rejyonal Anestezide Son Gelişmeler

7

Chang Chuan Melvin Lee, Arunangshu Chakraborty, ve Shri Vidya
Çeviri: Dr. Akcan AKKAYA

7.1 Giriş

Rejyonal anestezi uygulamaları son on yılda önemli ölçüde gelişmiştir. Çoğu gelişmiş sağlık sisteminde, sinir stimülatörü eşliğinde veya tek başına kullanılan anatomik landmark tekniklerinden, yeni bir bakım standardı olan ultrason rehberliğine bir geçiş görülmüştür [1, 2]. Daha gelişmiş ve erişilebilir hale gelen ultrasonografinin kullanıma girişi, rejyonal anestezi uygulamalarına köklü bir değişim getirirdi. Alışılmış anestezi uygulamaları için kullanılan temel tekniklerde ileri bir yetkinlik ve yeni bir bakım standartı sağlamıştır [1, 2]. Ultrason eşliğinde rejyonal anestezi başarı oranlarının da artmasını sağladığı gibi komplikasyonları da azaltabilir [3]. Ayrıca fasial plan blokları gibi yeni periferik sinir blok yaklaşımlarını kolaylaştırabilir. Rejyonal anestezi uygulamaları, zamanla, genel anesteziye basit bir alternatif olmaktan çıkmıştır. Opioid bazlı anestezi ve ağrı yönetiminin zararlı etkilerinin giderek daha fazla tanınmasıyla birlikte rejyonal anestezi, giderek artan bir şekilde multimodal anestezi ve ağrı yönetimi stratejisinin bir parçası olarak görülmektedir.

7.2 Genişleyen Rolleri

Rejyonal anestezi, giderek artan bir şekilde, genel anesteziye bir alternatif olmaktan çok daha fazlası olarak görülmektedir. Rejyonal anestezi, cerrahiye stres yanıtı köreltir ve merkezi sinir sistemi depresanlarına, opioidlere maruz kalmayı azaltıp hatta önler.

leme görevlerine başarıyla uygulanmıştır [58]. Bilhassa ticari olarak mevcut platformlarda miyokardial fonksiyon indekslerini hesaplamak için endokardial yapıların tespiti ve segmentasyonu gibi diğer ultrason uygulamalarında [59] otomatik yazılımlar kullanılmıştır (HeartModelA.I., Philips Healthcare) [60, 61]. Femoral sinir ve brakial pleksusun ultrason görüntülemelerinde de bir makine öğrenme modeli kullanılmaya başlanmıştır (Huang ve ark. 2019; Smistad ve ark. 2018) [62, 63]. Bu da klinik kullanım ve rejyonal anestezi eğitiminde, gelecekteki heyecan verici işlemlerde uygulanabilirliğini daha da doğrulamaktadır [64].

Kaynaklar

1. Sen S, Ge M, Prabhakar A, et al. Recent technological advancements in regional anesthe- sia. Best Pract Res Clin Anaesthesiol. 2019;33(4):499–505. https://doi.org/10.1016/j. bpa.2019.07.002.
2. Albrecht E, Chin KJ. Advances in regional anaesthesia and acute pain management: a narrative review. Anaesthesia. 2020;75:e101–10. https://doi.org/10.1111/anae.14868.
3. Admir Hadzic, Xavier Sala-Blanch, Daquan Xu. Ultrasound Guidance May Reduce but Not Eliminate Complications of Peripheral Nerve Blocks. Anesthesiology. 2008:108(4):557–58.
4. Memtsoudis SG, Sun X, Chiu YL, et al. Perioperative comparative effectiveness of anesthetic technique in orthopedic patients. Anesthesiology. 2013;118:1046–58.
5. Perlas A, Chan VW, Beattie S. Anesthesia technique and mortality after total Hip or Knee Arthroplasty: a retrospective. Propensity Score-matched Cohort Study. Anesthesiology. 2016;125:724–31.
6. McIsaac DI, Cole ET, McCartney CJ. Impact of including regional anaesthesia in enhanced recovery protocols: a scoping review. Br J Anaesth. 2015;115(Suppl 2):ii46–56. https://doi.org/10.1093/bja/aev376.
7. Helander EM, Webb MP, Bias M, Whang EE, Kaye AD, Urman RD. Use of regional anesthesia techniques: analysis of institutional enhanced recovery after surgery protocols for colorectal surgery. J Laparoendosc Adv Surg Tech A. 2017;27(9):898–902. https://doi.org/10.1089/lap.2017.0339.
8. Davis N, Lee M, Lin AY, et al. Postoperative cognitive function following general versus regional anesthesia: a systematic review. J Neurosurg Anesthesiol. 2014;26(4):369–76. https:// doi.org/10.1097/ANA.0000000000000120.
9. Mason SE, Noel-Storr A, Ritchie CW. The impact of general and regional anesthesia on the incidence of post-operative cognitive dysfunction and post-operative delirium: a systematic review with meta-analysis. J Alzheimers Dis. 2010;22(Suppl 3):67–79. https://doi.org/10.3233/JAD-2010-101086.
10. Cerneviciute R, Sahebally SM, Ahmed K, et al. Regional versus local anaesthesia for haemodialysis arteriovenous fistula formation: a systematic review and meta-analysis. Eur J Vasc Endovasc Surg. 2017;53:734–42.
11. Armstrong RA, Wilson C, Elliott L, et al. Regional anaesthesia practice for arteriovenous fistula formation surgery. Anaesthesia. 2020;75(5):626–33. https://doi.org/10.1111/anae.14983.
12. Sessler DI, Pei L, Huang Y, et al. Recurrence of breast cancer after regional or general anaesthesia: a randomised controlled trial. Lancet. 2019;394(10211):1807–15. https://doi.org/10.1016/S0140-6736(19)32313-X.
13. Tedore T. Regional anaesthesia and analgesia: relationship to cancer recurrence and survival. Br J Anaesth. 2015;115(Suppl 2):ii34–45. https://doi.org/10.1093/bja/aev375.
14. Cata JP. Outcomes of regional anesthesia in cancer patients. Curr Opin Anaesthesiol. 2018;31:593–600.

15. Divatia JV, Ambulkar R. Anesthesia and cancer recurrence: what is the evidence? J Anaesthesiol Clin Pharmacol. 2014;30(2):147–50. https://doi.org/10.4103/0970-9185.129990.
16. Marhofer P, Harrop-Griffiths W, Willschke H, Kirchmair L. Fifteen years of ultrasound guidance in regional anaesthesia: Part 2-recent developments in block techniques. Br J Anaesth. 2010;104(6):673–83. https://doi.org/10.1093/bja/aeq086. Epub 2010 Apr 23.
17. Marhofer P, Greher M, Kapral S. Ultrasound guidance in regional anaesthesia. Br J Anaesth. 2005;94(1):7–17. https://doi.org/10.1093/bja/aei002.
18. Hebl JR. Ultrasound-guided regional anesthesia and the prevention of neurologic injury: fact or fiction? Anesthesiology. 2008;108(2):186–8. https://doi.org/10.1097/01.anes.0000299835.04104.02.
19. Yves Auroy, Dan Benhamou, Laurent Bargues, Claude Ecoffey, Bruno Falissard, Frédéric Mercier, Hervé Bouaziz, Kamran Samii. Major Complications of Regional Anesthesia in France. Anesthesiology. 2002;97(5):1274–280.
20. Scholten HJ, Pourtaherian A, Mihajlovic N, Korsten HHM, A Bouwman R. Improving needle tip identification during ultrasound-guided procedures in anaesthetic practice. Anaesthesia. 2017;72(7):889–904. https://doi.org/10.1111/anae.13921.
21. Deam RK, Kluger R, Barrington MJ, McCutcheon CA. Investigation of a new echogenic needle for use with ultrasound peripheral nerve blocks. Anaesth Intensive Care. 2007;35(4):582–6. https://doi.org/10.1177/0310057X0703500419.
22. Hebard S, Hocking G. Echogenic technology can improve needle visibility during ultrasound-guided regional anesthesia. Reg Anesth Pain Med. 2011;36:185–9.
23. Henderson M, Dolan J. Challenges, solutions, and advances in ultrasound-guided regional anaesthesia. BJA Educ. 2016;16:mkw026. https://doi.org/10.1093/bjaed/mkw026.
24. Munirama S, McLeod G. Novel applications in ultrasound technology for regional anesthesia. Curr Anesthesiol Rep. 2013;3:230–5. https://doi.org/10.1007/s40140-013-0038-1
25. Kåsine T, Romundstad L, Rosseland LA, et al. The effect of needle tip tracking on procedural time of ultrasound-guided lumbar plexus block: a randomised controlled trial. Anaesthesia. 2020;75(1):72–9. https://doi.org/10.1111/anae.14846.
26. Daoud MI, Alshalalfah AL, Ait Mohamed O, Alazrai R. A hybrid camera- and ultrasound-based approach for needle localization and tracking using a 3D motorized curvilinear ultrasound probe. Med Image Anal. 2018;50:145–66. https://doi.org/10.1016/j.media.2018.09.006.
27. Xia W, Mari JM, West SJ, et al. In-plane ultrasonic needle tracking using a fiber-optic hydrophone. Med Phys. 2015;42(10):5983–91. https://doi.org/10.1118/1.4931418.
28. Rotemberg V, Palmeri M, Rosenzweig S, Grant S, Macleod D, Nightingale K. Acoustic Radiation Force Impulse (ARFI) imaging-based needle visualization. Ultrasonic imaging. 2011;33:1–16.
29. Neal JM, Barrington MJ, Brull R, et al. The second ASRA practice advisory on neurologic complications associated with regional anesthesia and pain medicine: Executive Summary 2015. Reg Anesth Pain Med. 2015;40(5):401–30. https://doi.org/10.1097/AAP.0000000000000286.
30. Gadsden JC, Choi JJ, Lin E, Robinson A. Opening injection pressure consistently detects needle- nerve contact during ultrasound-guided interscalene brachial plexus block. Anesthesiology. 2014;120(5):1246–53. https://doi.org/10.1097/ALN.0000000000000133.
31. Gadsden J, Latmore M, Levine DM, Robinson A. High opening injection pressure is associated with needle-nerve and needle-fascia contact during femoral nerve block. Reg Anesth Pain Med. 2016;41(1):50–5. https://doi.org/10.1097/AAP.0000000000000346.
32. Lin JA, Lu HT. A convenient alternative for monitoring opening pressure during multiple needle redirection. Br J Anaesth. April 2014;112(4):771–2. https://doi.org/10.1093/bja/aeu083.
33. Wahal C, Kumar A, Pyati S. Advances in regional anaesthesia: a review of current practice, newer techniques and outcomes. Indian J Anaesth. 2018;62(2):94–102. https://doi.org/10.4103/ija.IJA_433_17.
34. Lin JA, Blanco R, Shibata Y, Nakamoto T. Advances of techniques in deep regional blocks. Biomed Res Int. 2017;2017:7268308. https://doi.org/10.1155/2017/7268308.

35. Lin JA, Blanco R, Shibata Y, Nakamoto T, Lin KH. Corrigendum to "Advances of Techniques in Deep Regional Blocks". Biomed Res Int. 2018;2018:5151645. https://doi.org/10.1155/2018/5151645. Published 2018 Jul 5.
36. Blanco R. The 'pecs block': a novel technique for providing analgesia after breast surgery. Anaesthesia. 2011;66(9):847–8. https://doi.org/10.1111/j.1365-2044.2011.06838.x.
37. Blanco R, Fajardo M, Parras Maldonado T. Ultrasound description of Pecs II (modified Pecs I): a novel approach to breast surgery. Rev Esp Anestesiol Reanim. 2012;59(9):470–5. https:// doi.org/10.1016/j.redar.2012.07.003.
38. Blanco R, Parras T, McDonnell JG, Prats-Galino A. Serratus plane block: a novel ultrasound- guided thoracic wall nerve block. Anaesthesia. 2013 Nov;68(11):1107–13. https://doi.org/10.1111/anae.12344.
39. Nagaraja PS, Ragavendran S, Singh NG, et al. Comparison of continuous thoracic epidural analgesia with bilateral erector spinae plane block for perioperative pain management in cardiac surgery. Ann Card Anaesth. 2018;21(3):323–7. https://doi.org/10.4103/aca.ACA_16_18.
40. Wong WY, Bjørn S, Strid JM, Børglum J, Bendtsen TF. Defining the location of the adductor canal using ultrasound. Reg Anesth Pain Med. 2017;42(2):241–5. https://doi.org/10.1097/AAP.0000000000000539.
41. Conroy PH, Luyet C, McCartney CJ, McHardy PG. Real-time ultrasound-guided spinal anaesthesia: a prospective observational study of a new approach. Anesthesiol Res Pract. 2013;2013:525818. https://doi.org/10.1155/2013/525818.
42. Manohar M, Gupta B, Gupta L. Closed-loop monitoring by anesthesiologists-a comprehensive approach to patient monitoring during anesthesia. Korean J Anesthesiol. 2018;71(5):417–8. https://doi.org/10.4097/kja.d.18.00033.
43. Gholami B, Bailey JM, Haddad WM, Tannenbaum AR. Clinical decision support and closed-loop control for cardiopulmonary management and intensive care unit sedation using expert systems. IEEE Trans Control Syst Technol. 2012;20(5):1343–50. https://doi.org/10.1109/tcst.2011.2162412.
44. Platen PV, Pomprapa A, Lachmann B, et al. The dawn of physiological closed-loop ventilation—a review. Crit Care. 2020;24:121. https://doi.org/10.1186/s13054-020-2810-1
45. Sheahan CG, Mathews DM. Monitoring and delivery of sedation. Br J Anaesth. 2014;113(Suppl 2):ii37–47. https://doi.org/10.1093/bja/aeu378.
46. Uskova A, O'Connor JE. Liposomal bupivacaine for regional anesthesia. Curr Opin Anaesthesiol. 2015;28(5):593–7. https://doi.org/10.1097/ACO.0000000000000240.
47. Pichler L, Poeran J, Zubizarreta N, et al. Liposomal bupivacaine does not reduce inpatient opioid prescription or related complications after knee arthroplasty: a database analysis. Anesthesiology. 2018;129(4):689–99. https://doi.org/10.1097/ALN.0000000000002267.
48. Noviasky J, Pierce DP, Whalen K, Guharoy R, Hildreth K. Bupivacaine liposomal versus bupivacaine: comparative review. Hosp Pharm. 2014;49(6):539–43. https://doi.org/10.1310/hpj4906-539.
49. Liu Y, Zeng Y, Zeng J, et al. The efficacy of liposomal bupivacaine compared with traditional peri-articular injection for pain control following total knee arthroplasty: an updated meta-analysis of randomized controlled trials. BMC Musculoskelet Disord. 2019;20:306.
50. Kirksey MA, Haskins SC, Cheng J, Liu SS. Local anesthetic peripheral nerve block adjuvants for prolongation of analgesia: a systematic qualitative review. PLoS One. 2015;10(9):e0137312. https://doi.org/10.1371/journal.pone.0137312. Published 2015 Sep 10.
51. Marhofer P, Columb M, Hopkins PM, et al. Dexamethasone as an adjuvant for peripheral nerve blockade: a randomised, triple-blinded crossover study in volunteers. Br J Anaesth. 2019;122(4):525–31. https://doi.org/10.1016/j.bja.2019.01.004.
52. Zhang C, Li C, Pirrone M, Sun L, Mi W. Comparison of dexmedetomidine and clonidine as adjuvants to local anesthetics for intrathecal anesthesia: a meta-analysis of randomized controlled trials. J Clin Pharmacol. 2016;56(7):827–34. https://doi.org/10.1002/jcph.666.

53. Vorobeichik L, Brull R, Abdallah FW. Evidence basis for using perineural dexmedetomidine to enhance the quality of brachial plexus nerve blocks: a systematic review and meta-analysis of randomized controlled trials. Br J Anaesth. 2017;118(2):167–81. https://doi.org/10.1093/ bja/aew411.
54. Andersen JH, Grevstad U, Siegel H, Dahl JB, Mathiesen O, Jæger P. Does dexmedetomidine have a perineural mechanism of action when used as an adjuvant to ropivacaine?: A paired, blinded, randomized trial in healthy volunteers. Anesthesiology. 2017;126(1):66–73. https://doi.org/10.1097/ALN.0000000000001429.
55. Edwards RM, Currigan DA, Bradbeer S, Mitchell C. Does a catheter over needle system reduce infusate leak in continuous peripheral nerve blockade: a randomised controlled trial. Anaesth Intensive Care. 2018;46(5):468–73. https://doi.org/10.1177/0310057X1804600507.
56. Jordahn ZM, Lyngeraa TS, Grevstad U, et al. Ultrasound guided repositioning of a new suture-method catheter for adductor canal block – a randomized pilot study in healthy volunteers. BMC Anesthesiol. 2018;18:150. https://doi.org/10.1186/s12871-018-0615-4.
57. Fineran JJ IV, Gabriel RA, Swisher MW, et al. Suture catheter for rescue perineural catheter placement when unable to position a conventional through-the-needle catheter: a case report. A Pract. 2019;13(9):338–41. https://doi.org/10.1213/XAA.0000000000001075.
58. Liu S, Wang Y, Yang X et al. Deep Learning in Medical Ultrasound Analysis: A Review. Engineering. 2019;5:261–75.
59. Huang Q, Zhang F, Li X. Machine learning in ultrasound computer-aided diagnostic sys- tems: a survey. Biomed Res Int. 2018;2018:5137904. https://doi.org/10.1155/2018/5137904. Published 2018 Mar 4.
60. Volpato V, Mor-Avi V, Narang A, et al. Automated, machine learning-based, 3D echocardiographic quantification of left ventricular mass. Echocardiography. 2019;36(2):312–9. https://doi.org/10.1111/echo.14234.
61. Medvedofsky D, Mor-Avi V, Byku I, et al. Three-dimensional echocardiographic auto- mated quantification of left heart chamber volumes using an adaptive analytics algorithm: feasibility and impact of image quality in nonselected patients. J Am Soc Echocardiogr. 2017;30(9):879–85. https://doi.org/10.1016/j.echo.2017.05.018.
62. Huang C, Zhou Y, Tan W, et al. Applying deep learning in recognizing the femoral nerve block region on ultrasound images. Ann Transl Med. 2019;7(18):453. https://doi.org/10.21037/atm.2019.08.61.
63. Smistad E, Johansen KF, Iversen DH, Reinertsen I. Highlighting nerves and blood vessels for ultrasound-guided axillary nerve block procedures using neural networks. J Med Imaging (Bellingham). 2018;5(4):044004. https://doi.org/10.1117/1.JMI.5.4.044004.
64. Deserno TM, Oliveira JEE, Grottke O. Regional Anaesthesia Simulator and Assistant (RASimAs): Medical Image Processing Supporting Anaesthesiologists in Training and Performance of Local Blocks. 2015 IEEE 28th International Symposium on Computer-Based Medical Systems, Sao Carlos, 2015, pp. 348–351. https://doi.org/10.1109/CBMS.2015.61.