

BÖLÜM 110

HAREKET BOZUKLUKLARI VE SPASTİSİTEDE CERRAHİ TEDAVİ SEÇENEKLERİ VE NÖROMODÜLASYON

Halil ULUTABANCA¹
Berat ERTURHAN²

GİRİŞ

Hareket bozuklukları pediatrik nörolojide sık görülen nörolojik rahatsızlıkların ve çocuk nörolojisi kliniklerine en sık başvuru nedenlerinden biridir.¹ Çocukluk çağının hareket bozuklukları etiyoloji, zamanlama, tedavi ve erişkinlik dönemindeki hareket anomaliliklerine yönelik prognoz açısından farklıdır.^{1,2}

Bu bozukluklar, bozulmuş istemli hareketler, istemsiz hareketlerin varlığı veya her ikisi ile karakterizedir. Dinamik bozukluklardır ve şiddetleri ve dağılımları zamanla değişebilir.²

Geleneksel olarak hareket bozuklukları hiperkinetik ve hipokinetik bozukluklar olarak sınıflandırılır. Hiperkinetik hareket bozuklukları anormal tekrarlayan istemsiz hareketler (kore, distoni, atetoz, miyoklonus, stereotipler, tikler ve tremor) ile belirlenir. Aksine hipokinetik hareket bozuklukları, istemli hareketlerde azalma ve akinezi ile kendini gösterir.^{3,4} Pediatride hipokinetik hareket bozuklukları çok nadirdir görülür. Bu bölümde kısaca hareket bozuklukları ve spastisite hakkında bilgi verilip bu hastalıkların tedavisinde kullanılan cerrahi yöntemlerden bahsedilecektir.

KORE

Düzensiz, rastgele, kaotik, kısa ve amaçsız hareketler vücudun bir bölümünden diğerine akabilir.⁵ Bu hareketler isteyerek bastırılamaz.^{5,6} Kore vücudun herhangi bir bölgesinde olabilmekle birlikte en çok buyun ekstremitelerde proksimal kısımları yüz ve gövdeyi tutar. Koreli çocukların çoğunda beyin hasarı öyküsü olmasına rağmen, nadir görülen genetik nedenler göz önünde bulundurulmalıdır.⁶ Atetoz, ekstremitelerin distal kısmının proksimalden daha fazla tutulduğu, daha yavaş ve kıvrana bir kore şeklidir. Buna karşılık, Ballismus, esas olarak proksimal eklemeleri ve kasları içeren yüksek genlikli, güçlü ve savurgan bir kore şeklidir.⁵⁻⁷ Ballismus korenin daha ciddi bir tipi olarak kabul edilmektedir. Kore'nin sayısız nedeni vardır. Serebral palsi, serebral vaskülit, beyin tümörleri, encefalit, mitekondrial bozukluklar antiepileptik ilaçlar bunların bazılıdır.⁶⁻⁸

Patofizyolojik olarak kore tipik olarak striatum veya subtalamik çekirdeğin işlev bozukluğu nedeniyle oluşur.

¹ Dr. Öğr. Üyesi Erciyes Üniversitesi Tip Fakültesi, Beyin ve Sinir Cerrahisi Kliniği, ulutabanca@erciyes.edu.tr

² Arş. Gör. Erciyes Üniversitesi Tip Fakültesi, Beyin ve Sinir Cerrahisi Kliniği, mehmeterturhan@erciyes.edu.tr

KAYNAKLAR

1. Saunders-Pullman R, Braun I, Bressman S. Pediatric movement disorders. *Child Adolesc Psychiatr Clin North Am.* 1999; 8:747–65.
2. Singer HS, Mink JW, Gilbert DL, et al. Movement Disorders in Childhood, second ed. London: Academic Press; 2016.
3. Sanger TD, Chen D, Fehlings SL, Hallett M, Lang AE, Mink JW, et al. Definition and classification of hyperkinetic movements in childhood. *Mov Disord.* 2010;25(11):1538–49.
4. Dale RC, Singh H, Troedson C, Pillai S, Gaikiwari S, Kozlowska K. A prospective study of acute movement disorders in children. *Dev Med Child Neurol.* 2010;52(8):739–748.
5. Cardoso F, Seppi K, Mair KJ, Wenning GK, Poewe W. Seminar on choreas. *Lancet Neurol.* 2006;5:589–602.
6. Pandey S. Chorea. *J Assoc Physicians India.* 2013;61(7):471–4, 483.
7. Wild EJ, Tabrizi SJ. The differential diagnosis of chorea. *Pract Neurol.* 2007;7(6):360–73.
8. Gilbert DL. Acute and chronic chorea in childhood. *Semin Pediatr Neurol.* 2009;16(2):71–6.
9. Albanese A, Bhatia K, Bressman SB, Delong MR, Fahn S, Fung VS, et al. Phenomenology and classification of dystonia: A consensus update. *Mov Disord.* 2013; 28: 863–73.
10. Geyer HL, Bressman SB. The diagnosis of dystonia. *Lancet Neurol.* 2006;5(9):780–90.
11. Batla A. Dystonia: A review. *Neurol India.* 2018;66(Supplement):S48–S58.
12. Neychev VK, Gross RE, Lehericy S, et al. The functional neuroanatomy of dystonia. *Neurobiol Dis.* 2011;42(2):185–201
13. Macerollo A, Martino D. What is new in tics, dystonia and chorea? *Clin Med (Lond)* 2016;16(4):383–9.
14. Mahone EM, Bridges D, Prahme C, Singer HS. Repetitive arm and hand movements (complex motor stereotypies) in children. *J Pediatr.* 2004;145:391–5.
15. Muthugovindan D, Singer H. Motor stereotypy disorders. *Curr Opin Neurol.* 2009;22(2):131–6.
16. Kennedy CH, Meyer KA, Knowles T, Shukla S. Analyzing the multiple functions of stereotypical behavior for students with autism: Implications for assessment and treatment. *J Appl Behav Anal.* 2000; 33: 559–71.
17. Goldman S, Wang C, Salgado MW, Greene PE, Kim M, Rapin Motor stereotypies in children with autism and other developmental disorders. *Dev Med Child Neurol.* 2009;51(1):30–8.
18. Freeman RD, Soltanifar A, Baer S. Stereotypic movement disorder: easily missed. *Dev Med Child Neurol.* 2010;52(8):733–8.
19. Singer HS. Stereotypic movement disorders. *Handb Clin Neurol.* 2011;100:631.
20. Cohen SC, Leckman JF, Bloch, MH Clinical assessment of Tourette syndrome and tic disorders. *Neurosci Biobehav Rev.* 2013;37(6):997–1007.
21. Plessen KJ. Tic disorders and Tourette's syndrome. *Eur Child Adolesc Psychiatry.* 2013;22 Suppl 1:S55–60.
22. Knight T, Steeves T, Day L, Lowerison M, Jette N, Pringsheim T. Prevalence of Tic Disorders: A Systematic Review and Meta-Analysis. *Pediatr Neurol.* 2012;47(2):77–90.
23. Blackburn JS. Tic Disorders and PANDAS. *Semin Pediatr Neurol.* 2018; 25:25–33.
24. Doja A, Bookwala A, Pohl D, Rossi-Ricci A, Barrowman N, Chan J, Longmuir PE. Relationship between Physical Activity, Tic Severity and Quality of Life in Children with Tourette syndrome. *J Can Acad Child Adolesc Psychiatry.* 2018;27(4):222–227.
25. Louis ED, Dure LS, Pullman S. Essential tremor in childhood: A series of nineteen cases. *Mov Disord.* 2001;16: 921–3.
26. Keller S, Dure LS. Tremor in childhood. *Semin Pediatr Neurol.* 2002;27(1):9–17.
27. Prasad M, Ong MT, Whitehouse WP. Fifteen minute consultation: tremor in children. *Arch Dis Child Educ Pract Ed.* 2014;99(4):130–4.
28. Nikkhah A, Karimzadeh P, Taghdiri MM, Nasehi MM, Javadzadeh M, Khari E. Hyperkinetic Movement Disorders in Children: A Brief Review *Iran J Child Neurol.* 2019 Spring; 13(2): 7–16.
29. Mutch L, Alberman E, Hagberg B, et al. Cerebral palsy epidemiology: where are we now and where are we going? *Dev Med Child Neurol.* 1992;34(6):547–51.
30. Reeuwijk A, Van Schie PEM, Becher JG, et al. Effects of botulinum toxin type A on upper limb functions in children with cerebral palsy: a systematic review. *Clin Rehabil.* 2006;20(5):375–87.
31. O'Shea TM, Preisser JS, Klinepeter KL, et al. Trends in mortality and cerebral palsy in a geographically based cohort of very low birth weight neonates born between 1982 to 1994. *Pediatrics.* 1998;101(4 pt 1):642–7.
32. Shamsoddini AR. Comparison between the effect of neurodevelopmental treatment and sensory integration therapy on gross motor function in children with cerebral palsy. *Iran J Child Neurology.* 2010;4(1):31–38.
33. Shamsoddini AR, Hollisaz MT. Effect of sensory integration therapy on gross motor function in children with cerebral palsy. *Iran J Child Neurology.* 2009;3(1):43–8.
34. Michael RB. Management of spasticity. *Age Ageing.* 1998;27(2):239–45.
35. Goldstein EM. Spasticity management: an overview. *J Child Neurol.* 2001;16(1):16–23.
36. Sanger TD, Delgado MR, Gaebl-Spira D, et al. Classification and definition of disorders causing hypertonia in childhood. *Pediatrics.* 2003;111(1):e89–97.
37. Lundy C, Lumsden D, Fairhurst C. Treating complex movement disorders in children with cerebral palsy. *Ulster Med J.* 2009;78(3):157–63.
38. Amirsalari S, Dalvand H, Dehghan L, et al. The efficacy of botulinum toxin type A injection in the

- hamstring and calf muscles with and without serial foot casting in gait improvement in children with cerebral palsy. *Tehran Uni Med J.* 2011;69(8):509–17.
39. Meythaler JM. Concept of spastic hypertonia. *Phys Med Rehabil Clin N Am.* 2001;12(4):725–32.
 40. Dalvand H, Dehghan L, Feizy A, et al. The effect of foot serial casting along with botulinum toxin type-a injection on spasticity in children with cerebral palsy. *J Kerman Uni Med Sci.* 2012;19(6):562–73.
 41. Mandigo CE, Anderson RC. Management of childhood spasticity: a neurosurgical perspective. *Pediatr Ann.* 2006;35(5):354–62.
 42. Beukelman DR, Mirenda P. Augmentative and Alternative Communication: Management of Severe Communication Disorders in Children and Adults. 2nd ed. Baltimore: Brookes Publishing; 1999. pp. 246–9.
 43. Berker N, Yalçın S, editors. The HELP Guide to Cerebral Palsy. 2nd ed. Washington, USA: Global Help; 2010. pp. 30–3.
 44. Ashworth B. Preliminary trial of carisoprodol in multiple sclerosis. *Practitioner.* 1964;192:540–2.
 45. Tilton AH. Management of spasticity in children with cerebral palsy. *Semin Pediatr Neurol.* 2004;11(1):58–65.
 46. Matthews DJ, Balaban B. Management of spasticity in children with cerebral palsy. *Acta Orthop Traumatol Turc.* 2009;43(2):81–6.
 47. Agnesi F, Johnson MD, Vitek JL. Deep brain stimulation: how does it work? *Handb Clin Neurol.* 2013; 116 : 39-54.
 48. Li Q, Qian ZM, Arbuthnott GW, Key Y, Yung WH. Cortical effects of deep brain stimulation: Implications for the pathogenesis and treatment of Parkinson's disease. *JAMA Neurol.* 2014; 71:100–103.
 49. Arle JE, Mei LZ, Shils JL. Modeling of Parkinson's circuits and DBS electrode. I. Biophysical background and software. *Stereotact Function Neurosurgery.* 2008; 86 :1–15.
 50. Shils JL, Mei LZ, Arle JE. Modeling of Parkinson's circuits and DBS electrode. II. Evaluation of computer simulation model of basal ganglia with and without subthalamic nucleus stimulation. *Stereotact Function Neurosurgery.* 2008; 86 :16–29.
 51. Chang JY, Shi LH, Luo F, Zhang WM, Woodward DJ. Studies on the neural mechanisms of deep brain stimulation in rodent models of Parkinson's disease. *Neurosci Biobehav Rev.* 2008; 32 :352–366.
 52. Fox SH, Katzenschlager R, Lim SY, Ravina B, Seppi K, Coelho M, et al. Movement Disorder Society Evidence-Based Medicine Review Update: Treatments for motor symptoms of Parkinson's disease. *Move Disord.* 2011; 26 (Ek 3):S2–41.
 53. Weaver FM, Follett K, Stern M, Hur K, Harris C, Marks WJ, Jr, et al: Dual deep brain stimulation versus best medical therapy for patients with advanced Parkinson's disease: a randomized controlled trial. *JAMA.* 2009; 301:63-73.
 54. Davidoff RA: Antispasticity drugs: mechanisms of action. *Ann Neurol* 1985; 17: pp. 107-116.
 55. Hasnat MJ, Rice JE: Intrathecal baclofen for treating spasticity in children with cerebral palsy. *Cochrane Database Syst Rev* 2015; CD004552
 56. Berweck S, Lütjen S, Voss W, et al: Use of intrathecal baclofen in children and adolescents: interdisciplinary consensus table 2013. *Neuropediatrics* 2014; 45: pp. 294–308.
 57. Motta F, Antonello CE: Analysis of complications in 430 consecutive pediatric patients treated with intrathecal baclofen therapy: 14-year experience. *J Neurosurg Pediatr* 2014; 13: pp. 301-306.
 58. Vidailhet M, Jutras M-F, Grabi D, et. al: Deep brain stimulation for dystonia. *J Neurol Neurosurg Psychiatry* 2013; 84: pp. 1029-1042.
 59. Leland A A, Turner M, Pattisapu JV: Best-practice surgical techniques for intrathecal baclofen therapy. *J Neurosurg Pediatr* 2006; 104: pp. 233-239.
 60. Middleton FA, StrickPL: "Basal Ganglia Output and Cognition: Evidence from Anatomical, Behavioral, and Clinical Studies". *Brain and Cognition.* 2000 42 (2): 183–200.
 61. Trepanier LL, Saint-Cyr JA, Lozano AM, Lang A E: "Neuropsychological consequences of posteroventral pallidotomy for the treatment of Parkinson's disease". *Neurology.* 1998 51 (1): 207–15.
 62. Merello M, Starkstein S, Nouzeilles MI, Kuzis G, Leiguarda R."Bilateral pallidotomy for treatment of Parkinson's disease induced corticobulbar syndrome and psychic akinesia avoidable by globus pallidus lesion combined with contralateral stimulation". *Journal of Neurology, Neurosurgery & Psychiatry.* 71 (5): 611–14.
 63. Ghika Joseph, Ghika-Schmid F, Fankhauser H, et al: "Bilateral simultaneous posteroventral pallidotomy for the treatment of Parkinson's disease: Neuropsychological and neurological side effects". *Journal of Neurosurgery.* 1999 91 (2): 313–21.
 64. Lipsman N, Schwartz ML, Huang Y, Lee L, Sankar T, Chapman M, Hynynen K, Lozano AM: MR-guided focused ultrasound thalamotomy for essential tremor: a proof-of-concept study. *Lancet Neurol* 2013;12:462–468.
 65. Vansickle D, Volk V, Freeman P, Henry J, Baldwin M, Fitzpatrick CK: Electrode placement accuracy in robot-assisted asleep deep brain stimulation. *Annals of Biomedical Engineering* 47: 2019 1212-1222.
 66. Harary M, SegarDJ, Huang KT,Tafel IJ, Valdes PA, Cosgrove GR: Focused ultrasound in neurosurgery: a historical perspective. *Neurosurg Focus* 2018 44 (2): 1-9.
 67. Schlesinger I, Sinai A, Zaaroor M: MRI-Guided Focused Ultrasound in Parkinson's Disease: A Review. *Parkinson's Disease* 2017: 1-5.
 68. Enslin JMN, Langerak NG, Fieggen AG: The evolution of selective dorsal rhizotomy for the management of spasticity. *Neurotherapeutics* 2019;16:3–8
 69. Fasano VA, Broggi G, Zeme S: Intraoperative electrical stimulation for functional posterior rhizotomy. *Scand J Rehabil Med Suppl* 1988;17:149–154,