

DÜŞÜK GRADELİ GLIAL TÜMÖRLERDE CERRAHİ TEDAVİ PRENSİPLERİ

Zeki Serdar ATAİZİ

GİRİŞ

Düşük dereceli glial tümör terimi(DDGT), iyi huylu histolojisi ve normal beyin parankimini istila etme eğilimindeki yavaş ilerleme davranış ile karakterize bir dizi primer beyin tümörünü ifade eder. Bu neoplazmalar, Dünya Sağlık Örgütünün beyin tümörlerinin sınıflandırması tarafından grade II olarak sınıflandırılır ve grade II astrositom (fibrillere ve protoplazmik olarak ikiye ayrılır), grade II oligoastroositoma ve grade II oligodendrogloma olarak adlandırılan tümörleri içerir [7][12]. Önceki sınıflamaların aksine 2016 da WHO,SSS tümörlerini epigenetik ve genetik özelliklerine göre sınıflandırmıştır [11].

Erişkinlerde, her yıl yeni tanı konulan primer beyin tümörlerinin yaklaşık %15'ini oluştururlar[6]. DDTG, tipik olarak daha genç bireyleri etkileyen ve genellikle parsiyel nöbetlerle ortaya çıkan, yaş ortalaması 35 olan, erkeklerde kadınlara daha sık olan yavaş büyüyen tümörlerdir. Baş ağrısı, kişilik değişiklikleri ve fokal nörolojik bozukluklar diğer en sık görülen semptomları temsil eder. Nörolojik semptomlar arasında tümörün yeri ve büyülüğüne göre motor ,duyusal bozukluklar, disfaji ,afazi, disinhibisyon, apati ve vizüel bozukluklar bulunur. İlginç bir şekilde, bazı yazarlar düşük dereceli gliomaların elegan denilen hassas bölgelerde veya yakınlıklarında meydana gelme eğilimini rapor etmişlerdir. Bu bölgeler; motor ve duyu korteksi, konuşma merkezleri ve görme merkezlerine komşu kortikal veya subkortikal alanları ve insular lobu içerir (Resim-1) ve en sık görüldüğü alanlardır. Sık yerleşim gösterdiği bu alanlar, bazen rezeksyon imkanını kısıtlamakta, geniş rezeksyonlar sonrası nörolojik fonksiyon kaybı oluşma ihtimalini artırmaktadır[16].

tif elektrotimülyasyon haritalaması onkolojik beyin cerrahisinde günümüzde altın standart kabul edilen en güvenli tekniktir. Strip ve grid kullanılarak korteksin haritalaması monitorize edilmektedir. Nöroanestezide, önemli olup motor yolların geleneksel izlenmesinin ötesinde, uyanık hastalarda da intropoperatif haritalama da somatosensoriyel fonksiyonu, dil (fonoloji, sözdizimi, pragmatik, çok dillilik), mekanikal biliş, hesaplama, yargı, yürütme fonksiyonları ve hatta duygusal yönleri gibi karmaşık fonksiyonları yollarının tanımlanmasını bile sağlar. Bundan başka eş zamanlı görüntüleme yapan maliyeti yüksek olan intraoperatif MR, navigasyon ve yüksek frekanslı lineer dizilimli USG navigasyon, ve yine yüksek frekanslı lineer dizilimli USG teknigide güvenli cerrahi sağlayarak maksimum tümör dokusunun çıkarılmasına yardımcı olan tekniklerden sayılmaktadır.

KAYNAKLAR

1. Akkus Z, Ali I, Sedlář J, Agrawal JP, Parney IF, Giannini C, Erickson BJ (2017) Predicting Deletion of Chromosomal Arms 1p/19q in Low-Grade Gliomas from MR Images Using Machine Intelligence. *J Digit Imaging* 30:469–476. doi: 10.1007/s10278-017-9984-3
2. Bello L, Castellano A, Fava E, Casaceli G, Riva M, Scotti G, Gaini SM, Falini A (2010) Intraoperative use of diffusion tensor imaging fiber tractography and subcortical mapping for resection of gliomas: technical considerations. *Neurosurg Focus* 28:E6. doi: 10.3171/2009.12.focus09240
3. Bello L, Fava E, Carrabba G, Papagno C, Gaini SM (2010) Present day's standards in microsurgery of low-grade gliomas. *Adv Tech Stand Neurosurg* 35:113–157
4. Bello L, Gambini A, Castellano A, Carrabba G, Acerbi F, Fava E, Giussani C, Cadioli M, Blasi V, Casarotti A, Papagno C, Gupta AK, Gaini S, Scotti G, Falini A (2008) Motor and language DTI Fiber Tracking combined with intraoperative subcortical mapping for surgical removal of gliomas. *Neuroimage* 39:369–382. doi: 10.1016/j.neuroimage.2007.08.031
5. De Benedictis A, Moritz-Gasser S, Duffau H (2010) Awake mapping optimizes the extent of resection for low-grade gliomas in eloquent areas. *Neurosurgery* 66:1074–84; discussion 1084. doi: 10.1227/01.NEU.0000369514.74284.78
6. Bondy ML, Scheurer ME, Malmer B, Barnholtz-Sloan JS, Davis FG, Il'yasova D, Kruchko C, McCarthy BJ, Rajaraman P, Schwartzbaum JA, Sadetzki S, Schlehofer B, Tihan T, Wiemels JL, Wrensch M, Buffler PA (2008) Brain tumor epidemiology: consensus from the Brain Tumor Epidemiology Consortium. *Cancer* 113:1953–1968. doi: 10.1002/cncr.23741
7. Bush NAO, Chang SM, Berger MS (2017) Current and future strategies for treatment of glioma. *Neurosurg Rev* 40:1–14. doi: 10.1007/s10143-016-0709-8
8. Chang WH, Pei YC, Wei KC, Chao YP, Hui M, Heng C, Yeh A (2018) Intraoperative linguistic performance during awake brain surgery predicts postoperative linguistic deficits. *J Neurooncol* 139:215–223. doi: 10.1007/s11060-018-2863-z
9. Chen R, Ravindra VM, Cohen AL, Jensen RL, Salzman KL, Prescott AP, Colman H (2015) Molecular features assisting in diagnosis, surgery, and treatment decision making in low-grade gliomas. *Neurosurg Focus* 38:E2. doi: 10.3171/2015.1.FOCUS14745
10. Coburger J, Scheuerle A, Thal DR, Engelke J, Hlavac M, Wirtz CR, Konig R (2015) Linear array ultrasound in low-grade glioma surgery: histology-based assessment of accuracy in comparison to conventional intraoperative ultrasound and intraoperative MRI. *Acta Neurochir (Wien)* 157:195–206. doi: 10.1007/s00701-014-2314-3
11. Dewitt JC, Mock A, Louis DN (2017) The 2016 WHO classification of central nervous system tumors: What neurologists need to know. *Curr Opin Neurol* 30:643–649. doi: 10.1097/WCO.0000000000000490

12. Dolecek TA, Propp JM, Stroup NE, Kruchko C (2012) N E U RO - O N CO LO GY CBTRUS Statistical Report : Primary Brain and Central Nervous System Tumors Diagnosed in the United States in 2005 – 2009
13. Duffau H (2009) Surgery of low-grade gliomas: towards a “functional neurooncology”. *Curr Opin Oncol* 21:543–549. doi: 10.1097/CCO.0b013e3283305996
14. Duffau H (2011) Brain Mapping From Neural Basis of Cognition to Surgical Applications. Springer
15. Duffau H (2012) The challenge to remove diffuse low-grade gliomas while preserving brain functions. *Acta Neurochir (Wien)* 154:569–574. doi: 10.1007/s00701-012-1275-7
16. Duffau H, Capelle L (2004) Preferential brain locations of low-grade gliomas. *Cancer* 100:2622–2626. doi: 10.1002/cncr.20297
17. Duffau H, Lopes M, Arthuis F, Bitar A, Sichez JP, Van Effenterre R, Capelle L (2005) Contribution of intraoperative electrical stimulations in surgery of low grade gliomas: A comparative study between two series without (1985-96) and with (1996-2003) functional mapping in the same institution. *J Neurol Neurosurg Psychiatry* 76:845–851. doi: 10.1136/jnnp.2004.048520
18. Duffau H, Mandonnet E (2013) The “onco-functional balance” in surgery for diffuse low-grade glioma: integrating the extent of resection with quality of life. *Acta Neurochir (Wien)* 155:951–957. doi: 10.1007/s00701-013-1653-9
19. Gene H, Barnett (2011) Navigation for brain tumors. Youmans neurological surgery.6th ed, 6 th. Elsevier, Philedelphia
20. Gerard CS, Straus D, Byrne RW (2014) Surgical management of low-grade gliomas. *Semin Oncol* 41:458–467. doi: 10.1053/j.seminoncol.2014.06.008
21. Ius T, Isola M, Budai R, Pauletto G, Tomasino B, Fadiga L, Skrap M (2012) Low-grade glioma surgery in eloquent areas: volumetric analysis of extent of resection and its impact on overall survival. A single-institution experience in 190 patients: clinical article. *J Neurosurg* 117:1039–1052. doi: 10.3171/2012.8.JNS12393
22. Jakola AS, Myrmel KS, Kloster R, Torp SH, Lindal S, Unsgard G, Solheim O (2012) Comparison of a strategy favoring early surgical resection vs a strategy favoring watchful waiting in low-grade gliomas. *JAMA* 308:1881–1888. doi: 10.1001/jama.2012.12807
23. Kim W LL (2011) Intraoperative magnetic resonance imaging. Youmans neurological surgery, 6th ed. Elsevier, Philedelphia
24. Kumthekar P, Raizer J, Singh S (2015) Low-grade glioma. *Cancer Treat Res* 163:75–87. doi: 10.1007/978-3-319-12048-5_5
25. Lacroix M, Abi-Said D, Journey DR, Gokaslan ZL, Shi W, DeMonte F, Lang FF, McCutcheon IE, Hassenbusch SJ, Holland E, Hess K, Michael C, Miller D, Sawaya R (2001) A multivariate analysis of 416 patients with glioblastoma multiforme: prognosis, extent of resection, and survival. *J Neurosurg* 95:190–198. doi: 10.3171/jns.2001.95.2.0190
26. Lorenzen A, Groeschel S, Ernemann U, Wilke M, Schuhmann MU (2018) Role of presurgical functional MRI and diffusion MR tractography in pediatric low-grade brain tumor surgery: a single-center study. *Childs Nerv Syst* 34:2241–2248. doi: 10.1007/s00381-018-3828-4
27. Lu CY, Chen XL, Chen XL, Fang XJ, Zhao YL (2018) Clinical application of 3.0 T intraoperative magnetic resonance combined with multimodal neuronavigation in resection of cerebral eloquent area glioma. *Med (United States)* 97:1–7. doi: 10.1097/MD.00000000000011702
28. McGirt MJ, Chaichana KL, Attenello FJ, Weingart JD, Than K, Burger PC, Olivi A, Brem H, Quinones-Hinojosa A (2008) Extent of surgical resection is independently associated with survival in patients with hemispheric infiltrating low-grade gliomas. *Neurosurgery* 63:700–708. doi: 10.1227/01.NEU.0000325729.41085.73
29. McKnight TR, Smith KJ, Chu PW, Chiu KS, Cloyd CP, Chang SM, Phillips JJ, Berger MS (2011) Choline metabolism, proliferation, and angiogenesis in nonenhancing grades 2 and 3 astrocytoma. *J Magn Reson Imaging* 33:808–816. doi: 10.1002/jmri.22517
30. Nimsky C, Fujita A, Ganslandt O, Von Keller B, Fahlbusch R (2004) Volumetric assessment of glioma removal by intraoperative high-field magnetic resonance imaging. *Neurosurgery* 55:351–358. doi: 10.1227/01.neu.0000129694.64671.91

31. Pamir MN, Ozduman K, Dincer A, Yildiz E, Peker S, Ozek MM (2010) First intraoperative, shared-resource, ultrahigh-field 3-Tesla magnetic resonance imaging system and its application in low-grade glioma resection. *J Neurosurg* 112:57–69. doi: 10.3171/2009.3.JNS081139
32. Petridis AK, Anokhin M, Vavruska J, Mahvash M, Scholz M (2015) The value of intraoperative sonography in low grade glioma surgery. *Clin Neurol Neurosurg* 131:64–68. doi: 10.1016/j.clineuro.2015.02.004
33. Rohde V, Krombach GA, Baumert JH, Kreitschmann-Andermahr I, Weinzierl M, Gilsbach JM (2003) Measurement of motor evoked potentials following repetitive magnetic motor cortex stimulation during isoflurane or propofol anaesthesia. *Br J Anaesth* 91:487–492. doi: 10.1093/bja/aeg224
34. Serra C, Stauffer A, Actor B, Burkhardt J-K, Ulrich NH-B, Bernays R-L, Bozinov O (2012) Intraoperative high frequency ultrasound in intracerebral high-grade tumors. *Ultraschall Med* 33:E306–E312. doi: 10.1055/s-0032-1325369
35. Shafqat S, Hedley-Whyte ET, Henson JW (1999) Age-dependent rate of anaplastic transformation in low-grade astrocytoma. *Neurology* 52:867–869. doi: 10.1212/wnl.52.4.867
36. Sloan TB, Heyer EJ (2002) Anesthesia for intraoperative neurophysiologic monitoring of the spinal cord. *J Clin Neurophysiol* 19:430–443
37. Smith JS, Chang EF, Lamborn KR, Chang SM, Prados MD, Cha S, Tihan T, Vandenberg S, McDermott MW, Berger MS (2008) Role of extent of resection in the long-term outcome of low-grade hemispheric gliomas. *J Clin Oncol* 26:1338–1345. doi: 10.1200/JCO.2007.13.9337
38. Wang J, Liu X, Hou WH, Dong G, Wei Z, Zhou H, Duan YY (2008) The relationship between intra-operative ultrasonography and pathological grade in cerebral glioma. *J Int Med Res* 36:1426–1434. doi: 10.1177/147323000803600632
39. De Witt Hamer PC, Robles SG, Zwinderman AH, Duffau H, Berger MS (2012) Impact of intraoperative stimulation brain mapping on glioma surgery outcome: a meta-analysis. *J Clin Oncol* 30:2559–2565. doi: 10.1200/JCO.2011.38.4818
40. Zhang S, Chiang GC-Y, Magge RS, Fine HA, Ramakrishna R, Chang EW, Pulisetty T, Wang Y, Zhu W, Kovanlikaya I (2019) Texture analysis on conventional MRI images accurately predicts early malignant transformation of low-grade gliomas. *Eur Radiol* 29:2751–2759. doi: 10.1007/s00330-018-5921-1
41. Zhang S, Chiang GC-Y, Magge RS, Fine HA, Ramakrishna R, Chang EW, Pulisetty T, Wang Y, Zhu W, Kovanlikaya I (2019) MRI based texture analysis to classify low grade gliomas into astrocytoma and 1p/19q codeleted oligodendrogloma. *Magn Reson Imaging* 57:254–258. doi: 10.1016/j.mri.2018.11.008