

BÖLÜM 26

AKSELERE PARSİYEL MEME RADYOTERAPİSİ AKSELERE PARSİYEL MEME RADYOTERAPİSİ

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GİRİŞ

İnvaziv meme kanserinin standart tedavisi, meme koruyucu cerrahi sonrası tüm meme radyoterapisi(WBRT)(1). Çok sayıda randomize çalışma ve meta analizde, radyoterapinin lokal kontrolü artırdığı ve meme kanserine bağlı mortaliteyi azalttığı gösterilmekle birlikte, 6 hafta süren standart radyoterapi uygulaması bazı hastalar için zaman, ulaşılabilirlik ve maliyet açısından uygun olmamaktadır. Bu amaçla, efektif ve yan etki açısından güvenli ,akselere tedavi formları geliştirilmiştir.

Rezidüel tümör hücrelerinin çoğunluğu eksizyon kavitesinin milimetrik olarak çok yakınında yer almaktadır(2). Lokal rekürrenslerin üçte ikisinden daha fazlası primer tümör lokalizasyonunun çok yakınında meydana gelmektedir(3). Bu bilgiden hareketle,uygun hasta seçimi ile, tümör çevresindeki sınırlı volümün akselere parsiyel meme radyoterapisi (APBI) ile tedavisi, WBRT kadar efektif, yan etki profili daha düşük ve daha kısa sürede tamamlanan bir tedavi yaklaşımıdır(4).

APBI uygulamasında kullanılan başlıca teknikler; düşük (LDR) veya yüksek hızlı (HDR) interstisyal multikateter implantasyon(5), tek balon kateterle uygulanan HDR brakiterapi (Mammosite)(6,7), kalıcı interstisyal implantasyon(8), 50 kilovolt fotonlar ,yüksek enerjili elektronlar, veya brakiterapi tekniği ile tek fraksiyonda intraoperatif irradyasyon (9,10,11) veya foton, foton-elektron veya protonlar kullanılarak uygulanan 3 boyutlu konformal eksternal irradyasyon (EBRT)

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SONUÇ

Son yıllarda gelişen teknoloji, uygulanan sağlık politikaları ve hasta farkındalığının artması ile meme kanseri erken evrede tanısı konulabilen bir hastalık haline gelmiştir. Erken evre meme kanserinin standart tedavisi meme koruyucu cerrahi sonrası, gereklilik halinde kemoterapi ve konvansiyonel fraksiyonasyon ile uygulanan radyoterapidir. Ancak tedavi süresinin uzun ve bazı durumlarda ulaşılabilirliğinin zor olması, uzmanları alternatif çözüm arayışına yönlendirmiştir. Bu doğrultuda yapılan çalışmalar ve oluşturulan tedavi kılavuzları ile APBI, uygun hasta ve tedavi tekniği seçimi yapmak şartı ile, meme kanseri için etkin ve standart radyoterapiye eşdeğer bir tedavi alternatif olma yolunda ilerlemektedir.

KAYNAKLAR

1. National Institutes of Health Consensus Development Conference Statement: Adjuvant therapy for breast cancer, November 1–3, 2000. *J Natl Cancer Inst Monogr* 2001;2001(30):5–15.
2. Holland R, Connolly JL, Gelman R, et al. The presence of an extensive intraductal component following a limited excision correlates with prominent residual disease in the remainder of the breast. *J Clin Oncol*. 1990;8:113–118.
3. Mannino M, Yarnold J. Accelerated partial breast irradiation trials: diversity in rationale and design. *Radiother Oncol*. 2009;91:16–22.
4. Offersen BV, Overgaard M, Kroman N, et al. Accelerated partial breast irradiation as part of breast conserving therapy of early breast carcinoma: a systematic review. *Radiother Oncol*. 2009;90:1–13.
5. Vicini FA, Arthur DW. Breast brachytherapy: North American experience. *Semin Radiat Oncol*. 2005;15:108–115.
6. Shah NM, Wazer DE. The MammoSite balloon brachytherapy catheter for accelerated partial breast irradiation. *Semin Radiat Oncol*. 2005;15:100–107.
7. Strauss JB, Dickler A. Accelerated partial breast irradiation utilizing balloon brachytherapy techniques. *Radiother Oncol*. 2009;91:157–165.
8. Pignol JP, Rakovitch E, Keller BM, et al. Tolerance and acceptance results of a palladium-103 permanent breast seed implant Phase I/II study. *Int J Radiat Oncol Biol Phys*. 2009;73:1482–1488.
9. Vaidya JS, Baum M, Tobias JS, et al. Targeted intra-operative radiotherapy (*Targit*): an innovative method of treatment for early breast cancer. *Ann Oncol*. 2001;12:1075–1080.
10. Veronesi U, Gatti G, Luini A, et al. Full-dose intraoperative radiotherapy with electrons during breast-conserving surgery. *Arch Surg*. 2003;138:1253–1256.
11. Beal K, McCormick B, Zelefsky MJ, et al. Single-fraction intraoperative radiotherapy for breast cancer: early cosmetic results. *Int J Radiat Oncol Biol Phys*. 2007;69:19–24.
12. Formenti SC, Rosenstein B, Skinner KA, et al. T1 stage breast cancer: adjuvant hypofractinated conformal radiation therapy to tumor bed in selected postmenopausal breast cancer patients—pilot feasibility study. *Radiology*. 2002;222:171–178.
13. Baglan KL, Sharpe MB, Jaffray D, et al. Accelerated partial breast irradiation using 3D-conformal radiation therapy (3D-CRT). *Int J Radiat Oncol Biol Phys*. 2003;55:302–311.
14. Moran JM, Ben-David MA, Marsh RB, et al. Accelerated partial breast irradiation: what is dosimetric effect of advanced technology approaches? *Int J Radiat Oncol Biol Phys*. 2009;75:294–301.
15. Kozak KR, Doppke KP, Katz A, et al. Dosimetric comparison of two different three-dimensi-

- onal conformal external beam accelerated partial breast irradiation techniques. *Int J Radiat Oncol Biol Phys.* 2006;65:340–346.
- 16. Galland-Girodet S, Pashtan I, MacDonald SM, et al. Long-term cosmetic outcomes and toxicities of proton beam therapy compared with photon-based 3-dimensional conformal accelerated partial-breast irradiation: a phase 1 trial. *Int J Radiat Oncol Biol Phys.* 2014;90:493–500.
 - 17. Strom EA, Amos RA, Shaitelman SF, et al. Proton partial breast irradiation in the supine position: treatment description and reproducibility of a multibeam technique. *Pract Radiat Oncol.* 2015;5:e283–e290.
 - 18. Benjamin D, Smith, M.D., Douglas W, Arthur, M.D., Thomas A, Buhholz, M.D., et al. Accelerated partial breast irradiation consensus statement from the American Society for Radiation Oncology (ASTRO) *Int. J. Radiation Oncology Biol. Phys.*, Vol. 74, No. 4, pp. 987–1001, 2009
 - 19. Correa Candace, Harris Eleanor E, Leonardi Maria Cristina, et al Accelerated Partial Breast Irradiation: Executive Summary for the Update of an ASTRO Evidence-Based Consensus Statement, *Practical Radiation Oncology* (2016), doi: 10.1016/j.prro.2016.09.00
 - 20. Vratislav Strnad, Tibor Major, Csaba Polgar, et al. ESTRO-ACROP guideline: Interstitial multi-catheter breast brachytherapy as Accelerated Partial Breast Irradiation alone or as boost–GEC-ESTRO Breast Cancer Working Group practical recommendations. *Radiotherapy and Oncology* 128 (2018) 411–420
 - 21. Pierquin B, Wilson JF, Chassagne D. The Paris system. Modern brachytherapy. Masson Publishing USA, Inc.; 1987.
 - 22. Gutierrez C, Najjari D, Martinez E, Botella S, Eraso A, Pino F, et al. The use of an interstitial boost in the conservative treatment of breast cancer: how to perform it routinely in a radiotherapy department. *J Contemp Brachytherapy* 2015;6:397–403.
 - 23. Strnad V, Hannoun-Levi JM, Guinot JL, Lossl K, Kauer-Dorner D, Resch A, et al. Recommendations from GEC ESTRO Breast Cancer Working Group (I): Target definition and target delineation for accelerated or boost Partial Breast Irradiation using multicatheter interstitial brachytherapy after breast conserving closed cavity surgery. *Radiother Oncol* 2015;115:342–8.
 - 24. Fitzal F, Nehrer G, Hoch D, et al. An oncoplastic procedure for central and medio-cranial breast cancer. *Eur J Surg Oncol* 2007;33:1158–63
 - 25. Roth AM, Resch A, Kauer-Dorner D. Is oncoplastic surgery a contraindication for accelerated partial breast radiation (APBI) using the interstitial multicatheter brachytherapy method? *Brachytherapy* 2014;13:394–9.
 - 26. Major T, Gutierrez C, Guix B, van Limbergen E, Strnad V, Polgar C, et al. Recommendations from GEC ESTRO Breast Cancer Working Group (II): Target definition and target delineation for accelerated or boost partial breast irradiation using multicatheter interstitial brachytherapy after breast conserving open cavity surgery. *Radiother Oncol* 2016;118:199–204.
 - 27. Strnad V, Ott OJ, Hildebrandt G, Kauer-Dorner D, Knauerhase H, Major T, et al. 5-year results of accelerated partial breast irradiation using sole interstitial multicatheter brachytherapy versus whole-breast irradiation with boost after breast-conserving surgery for low-risk invasive and in-situ carcinoma of the female breast: a randomised, phase 3, non-inferiority trial. *Lancet* 2016;387:229–38.
 - 28. Hannoun-Levi JM, Resch A, Gal J, Kauer-Dorner D, Strnad V, Niehoff P, et al. Accelerated partial breast irradiation with interstitial brachytherapy as second conservative treatment for ipsilateral breast tumour recurrence: multicentric study of the GEC-ESTRO Breast Cancer Working Group. *Radiother Oncol* 2013;108:226–31.
 - 29. Frank A Vicini, Reena S Cecchini, Julia R White, et al. Long-term primary results of accelerated partial breast irradiation after breast-conserving surgery for early-stage breast cancer: a randomised, phase 3, equivalence trial *Lancet*. 2019 Dec 14;394(10215):2155–2164.
 - 30. Arthur DW, Vicini FA. MammoSite RTS: the reporting of initial experiences and how to interpret. *Ann Surg Oncol* 2004;11(8):723–724.
 - 31. Keisch M, Vicini F, Kuske RR, et al. Initial clinical experience with the MammoSite breast bra-

- chytherapy applicator in women with early-stage breast cancer treated with breast-conserving therapy. *Int J Radiat Oncol Biol Phys* 2003;55(2):289–293.
- 32. Sharad Goyal, Thomas Buchholz, and Bruce G. Haffty, Breast Cancer: Early Stage, Perez and Brady's principles and practice of radiation oncology / [edited by] Edward C. Halperin,David E. Wazer, Carlos A. Perez, Luther W. Brady. Seventh edition. | Philadelphia : Wolters Kluwer, 2018, (pp 5451)
 - 33. Vicini F, Beitsch P, Quiet C, et al. Five-year analysis of treatment efficacy and cosmesis by the American Society of Breast Surgeons MammoSite Breast Brachytherapy Registry Trial in patients treated with accelerated partial breast irradiation. *Int J Radiat Oncol Biol Phys* 2011;79(3):808–817.
 - 34. Formenti SC. External-beam partial-breast irradiation. *Semin Radiat Oncol* 2005;15(2):92–99.
 - 35. Vicini F, Winter K, Straube W, et al. A phase I/II trial to evaluate three dimensional conformal radiation therapy confined to the region of the lumpectomy cavity for stage I/II breast carcinoma: initial report of feasibility and reproducibility of Radiation Therapy Oncology Group (RTOG) Study 0319. *Int J Radiat Oncol Biol Phys* 2005;63(5):1531–1537.
 - 36. Vicini F, Winter K, Wong J, et al. Initial efficacy results of RTOG 0319: three-dimensional conformal radiation therapy (3D-CRT) confined to the region of the lumpectomy cavity for stage I/II breast carcinoma. *Int J Radiat Oncol Biol Phys* 2010;77(4):1120–1127.
 - 37. Olivotto IA, Whelan TJ, Parpia S, et al. Interim cosmetic and toxicity results from RAPID: a randomized trial of accelerated partial breast irradiation using three-dimensional conformal external beam radiation therapy. *J Clin Oncol* 2013;31(32):4038–4045.
 - 38. Sedlmayer F, Reitsamer R, Wenz F, Sperk E, Fussl C, Kaiser J, et al. Intraoperative radiotherapy (IORT) as boost in breast cancer. *Radiation oncology* (London, England). 2017;12:23.
 - 39. Belletti B, Vaidya JS, D'Andrea S, Entschladen F, Roncadin M, Lovat F, et al. Targeted intraoperative radiotherapy impairs the stimulation of breast cancer cell proliferation and invasion caused by surgical wounding. *Clin Cancer Res.* 2008;14:1325–32.
 - 40. Veldwijk MR, Neumaier C, Gerhardt A, Giordano FA, Sütterlin M, Herskind C, et al. Comparison of the proliferative and clonogenic growth capacity of wound fluid from breast cancer patients treated with and without intraoperative radiotherapy. *Translational Cancer Research.* 2015;4:173–7.
 - 41. Herskind C, Wenz F. Radiobiological aspects of intraoperative tumour-bed irradiation with low-energy X-rays (LEX-IORT). *Translational Cancer Research.* 2014;3:3–17.
 - 42. Fastner, G., Gaisberger, C., Kaiser, J., Scherer, P., Ciabattoni, A., Petoukhova, A., Sperk, E., Poortmans, P., Calvo, F.A., Sedlmayer, F., Cristina Leonardi, M., ESTRO IORT Task Force/AC-ROP recommendations for intraoperative radiation therapy with electrons (IOERT) in breast cancer, *Radiotherapy and Oncology* (2020), doi: <https://doi.org/10.1016/j.radonc.2020.04.059>
 - 43. Veronesi U, Orecchia R, Luini A, Gatti G, Intra M, Zurrida S, et al. A preliminary report of intraoperative radiotherapy (IORT) in limited-stage breast cancers that are conservatively treated. *European journal of cancer* (Oxford, England : 1990). 2001;37:2178–83.
 - 44. Veronesi U, Orecchia R, Maisonneuve P, Viale G, Rotmensz N, Sangalli C, et al. Intraoperative radiotherapy versus external radiotherapy for early breast cancer (ELIOT): a randomised controlled equivalence trial. *The Lancet Oncology.* 2013;14:1269–77.
 - 45. Smith BD, Arthur DW, Buchholz TA, Haffty BG, Hahn CA, Hardenbergh PH, et al. Accelerated partial breast irradiation consensus statement from the American Society for Radiation Oncology (ASTRO). *International journal of radiation oncology, biology, physics.* 2009;74:987–1001.
 - 46. Correa C, Harris EE, Leonardi MC, Smith BD, Taghian AG, Thompson AM, et al. Accelerated Partial Breast Irradiation: Executive summary for the update of an ASTRO Evidence-Based Consensus Statement. *Practical radiation oncology.* 2017;7:73–9.
 - 47. Polgar C, Van Limbergen E, Potter R, Kovacs G, Polo A, Lyczek J, et al. Patient selection for accelerated partial-breast irradiation (APBI) after breast-conserving surgery: recommendations of the Groupe Europeen de Curietherapie-European Society for Therapeutic Radiology

- and Oncology (GEC-ESTRO) breast cancer working group based on clinical evidence (2009). *Radiotherapy and oncology : journal of the European Society for Therapeutic Radiology and Oncology*. 2010;94:264-73.
48. Leonardi MC, Maisonneuve P, Mastropasqua MG, Morra A, Lazzari R, Rotmensz N, et al. How do the ASTRO consensus statement guidelines for the application of accelerated partial breast irradiation fit intraoperative radiotherapy? A retrospective analysis of patients treated at the European Institute of Oncology. *International journal of radiation oncology, biology, physics*. 2012;83:806-13.
 49. Leonardi MC, Maisonneuve P, Mastropasqua MG, Morra A, Lazzari R, Dell'Acqua V, et al. Accelerated partial breast irradiation with intraoperative electrons: using GEC ESTRO recommendations as guidance for patient selection. *Radiotherapy and oncology : journal of the European Society for Therapeutic Radiology and Oncology*. 2013;106:21-7.
 50. Maluta S, Dall'Oglio S, Marciali N, Gabbani M, Franchini Z, Pietrarota P, et al. Accelerated partial breast irradiation using only intraoperative electron radiation therapy in early stage breast cancer. *International journal of radiation oncology, biology, physics*. 2012;84:e145-52.
 51. Takanen S, Gambirasio A, Gritti G, Kalli M, Andreoli S, Fortunato M, et al. Breast cancer electron intraoperative radiotherapy: assessment of preoperative selection factors from a retrospective analysis of 758 patients and review of literature. *Breast cancer research and treatment*. 2017;165:261-71.
 52. Ollila DW, Klauber-DeMore N, Tesche LJ, Kuzmiak CM, Pavic D, Goyal LK, et al. Feasibility of breast preserving therapy with single fraction in situ radiotherapy delivered intraoperatively. *Annals of surgical oncology*. 2007;14:660-9.
 53. Martignano A, Menegotti L, Valentini A. Monte Carlo investigation of breast intraoperative radiation therapy with metal attenuator plates. *Medical physics*. 2007;34:4578-84.