

## Bölüm 11

# PERİPROSTETİK KALÇA KIRIKLARINDA TEDAVİ SEÇENEKLERİ

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## GİRİŞ

Periprostetik femur veya asetabulum kırıkları total kalça protezi ve hemiartroplasti ameliyatı sırasında veya sonrasında oluşabilir. Bu kırıklärın tedavisi ortopedistleri zorlamaktadır. Son yıllarda çimentosuz asetabular ve femoral komponentlerin presfit olarak yaygın kullanılması bu kırıklärın gelişme riskini arttırmıştır. Kalça arthroplastisine bağlı kırıklär daha çok femur kırığı şeklinde görülür ve genellikle tedavi gerektirir. Asetabulum kırıklärı da sık olarak görülür fakat klinik veya radyolojik bulgu vermez.

## 1-PERİPROSTETİK FEMUR KIRIKLARI

Periprostetik femur kırıklärı ameliyat sırasında ya da sonrasında oluşabilir. Bu kırıklärın tanısının doğru bir şekilde konulması ve tedavi edilmesi hastanın yaşam kalitesini artırmak için oldukça önemlidir.

Femur kırığı, ameliyatın birçok aşamasında gelişebilir. Ameliyatın erken aşamalarında femur başının çıkartılması sırasında, ilerleyen aşamalarda femurun raspalanması sırasında, femoral stemin uygulanması sırasında ve kalçanın yerleştirilmesi sırasında oluşabilir. Ameliyatta osteoporoz, osteomalazi, romatoid artrit, osteogenezis imperfekta gibi metabolik ve femurun delinmesi, revizyon cerrahisi, patolojik kırık zemininde yapılan ameliyatlar, çimentosuz implant uygulanması, implant kemik uyumsuzluğu gibi lokal faktörler femur kırığı riskini artırmaktadır (1).

Ameliyatta kırıklärın çimentosuz bileşenlerde 14 kat fazla olduğu ve 65 yaş üstü kadınların daha fazla risk altında olduğu bildirilmiştir (1-5).

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Sonuç olarak B2 ve B3 kırıklarda öncelikle plak vida ile stabil bir arka kolon fiksasyonu ve kemik greflemesi sonrası stabil bir asetabuler fiksasyonu önerilir.

### **Tip A Kırıklar**

Kalça protezinden bağımsız kırıklardır ve tedavisinde kısmi yük verdirmeye ile ameliyatsız takip edilirler

### **Tip C Kırıklar**

Bu kırıklar kalça protezinden uzaktadır ve implant stabilitesini etkilemez. Bu kırıklar genellikle osteoporotik kırıklardır nadiren yüksek enerjili travmalar sonrası oluşabilir. Literatürde bu kırıklarla ilgili bildirilmiş çalışma yoktur.

### **Tip D Kırıklar**

İki kalça protezi arasındaki pelvis kırıklarında her bir protezi ayrı ayrı değerlendirerek ayrı ayrı müdahale etmek gereklidir.

### **Tip E Kırıklar**

Kalça protezinin her iki tarafında da kırık vardır. Bu kırıklarda her iki kırık ayrı ayrı analiz edilir.

### **Tip F Kırıklar**

Hemiarthroplasti sonrası karşılaşılan asetabulum kırığıdır. Kırık hafif derecede yer değiştirmişse ameliyatsız olarak takip edilmeli, ileride ağrılı bir kalça eklemi olursa total kalça protezi ile yenilenmelidir. Yer değiştirmiş bir kırıksa içten tespit uygulanmalıdır. Total kalça protezine revize edilmesi gerekirse kırık kaynadıktan sonra yapılmalıdır.

## **KAYNAKLAR**

1. Abdel MP, Watts CD, Houdek MT, et al. Epidemiology of periprosthetic fracture of the femur in 32 644 primary total hip arthroplasties: a 40-year experience. *Bone Joint J.* 2016 Apr;98-B(4):461-7. doi: 10.1302/0301-620X.98B4.37201. Erratum in: *Bone Joint J.* 2020 Dec;102-B(12):1782. PMID: 27037427.
2. Wu CC, Au MK, Wu SS, et al. Risk factors for postoperative femoral fracture in cementless hip arthroplasty. *J Formos Med Assoc.* 1999 Mar;98(3):190-4. PMID: 10365538.
3. Beals RK, Tower SS. Periprosthetic fractures of the femur. An analysis of 93 fractures. *Clin Orthop Relat Res.* 1996 Jun;(327):238-46. doi: 10.1097/00003086-199606000-00029. PMID: 8641069.
4. Lindahl H, Malchau H, Odén A, et al. Risk factors for failure after treatment of a periprosthetic fracture of the femur. *J Bone Joint Surg Br.* 2006 Jan;88(1):26-30. doi: 10.1302/0301-620X.88B1.17029. PMID: 16365115.

5. Scott RD, Turner RH, Leitzes SM, et al. Femoral fractures in conjunction with total hip replacement. *J Bone Joint Surg Am.* 1975 Jun;57(4):494-501. PMID: 1141259.
6. Berry DJ, Lewallen DG, Hanssen AD, et al. Pelvic discontinuity in revision total hip arthroplasty. *J Bone Joint Surg Am.* 1999 Dec;81(12):1692-702. doi: 10.2106/00004623-199912000-00006. PMID: 10608380.
7. Meek RM, Garbuz DS, Masri BA, et al. Intraoperative fracture of the femur in revision total hip arthroplasty with a diaphyseal fitting stem. *J Bone Joint Surg Am.* 2004 Mar;86(3):480-5. doi: 10.2106/00004623-200403000-00004. PMID: 14996872.
8. Carli AV, Negus JJ, Haddad FS. Periprosthetic femoral fractures and trying to avoid them: what is the contribution of femoral component design to the increased risk of periprosthetic femoral fracture? *Bone Joint J.* 2017 Jan;99-B (1 Supple A):50-59. doi: 10.1302/0301-620X.99B1.BJJ-2016-0220.R1. PMID: 28042119.
9. Lindahl H, Garellick G, Regnér H, et al. Three hundred and twenty-one periprosthetic femoral fractures. *J Bone Joint Surg Am.* 2006 Jun;88(6):1215-22. doi: 10.2106/JBJS.E.00457. PMID: 16757753.
10. Füchtmeier B, Galler M, Müller F. Mid-Term Results of 121 Periprosthetic Femoral Fractures: Increased Failure and Mortality Within but not After One Postoperative Year. *J Arthroplasty.* 2015 Apr;30(4):669-74. doi: 10.1016/j.arth.2014.11.006. Epub 2014 Nov 10. PMID: 25434610.
11. Patsiogiannis N, Kanakaris NK, Giannoudis PV. Periprosthetic hip fractures: an update into their management and clinical outcomes. *EORT Open Rev.* 2021 Jan 4;6(1):75-92. doi: 10.1302/2058-5241.6.200050. PMID: 33532088; PMCID: PMC7845569.
12. Lindahl H, Malchau H, Herberts P, et al. Periprosthetic femoral fractures classification and demographics of 1049 periprosthetic femoral fractures from the Swedish National Hip Arthroplasty Register. *J Arthroplasty.* 2005 Oct;20(7):857-65. doi: 10.1016/j.arth.2005.02.001. PMID: 16230235.
13. Rozell JC, Donegan DJ. Periprosthetic Femur Fractures Around a Loose Femoral Stem. *J Orthop Trauma.* 2019 Sep;33 Suppl 6:S10-S13. doi: 10.1097/BOT.0000000000001568. PMID: 31404038.
14. Schwarzkopf R, Oni JK, Marwin SE. Total hip arthroplasty periprosthetic femoral fractures: a review of classification and current treatment. *Bull Hosp Jt Dis* (2013). 2013;71(1):68-78. PMID: 24032586.
15. Capone A, Congia S, Civinini R, et al. Periprosthetic fractures: epidemiology and current treatment. *Clin Cases Miner Bone Metab.* 2017 May-Aug;14(2):189-196. doi: 10.11138/ccmbm/2017.14.1.189. Epub 2017 Oct 25. PMID: 29263732; PMCID: PMC5726208.
16. Abdel MP, Cottino U, Mabry TM. Management of periprosthetic femoral fractures following total hip arthroplasty: a review. *Int Orthop.* 2015 Oct;39(10):2005-10. doi: 10.1007/s00264-015-2979-0. Epub 2015 Aug 29. PMID: 26318883.
17. Kim YH, Mansukhani SA, Kim JS, et al. Use of Locking Plate and Strut Onlay Allografts for Periprosthetic Fracture Around Well-Fixed Femoral Components. *J Arthroplasty.* 2017 Jan;32(1):166-170. doi: 10.1016/j.arth.2016.05.064. Epub 2016 Jun 7. PMID: 27407037.
18. Chatziagorou G, Lindahl H, Kärrholm J. Surgical treatment of Vancouver type B periprosthetic femoral fractures: patient characteristics and outcomes of 1381 fractures treated in Sweden between 2001 and 2011. *Bone Joint J.* 2019 Nov;101-B(11):1447-1458. doi: 10.1302/0301-620X.101B11.BJJ-2019-0480.R2. PMID: 31674248.

19. Mondanelli N, Troiano E, Facchini A, et al. Treatment Algorithm of Periprosthetic Femoral Fracturens. *Geriatr Orthop Surg Rehabil.* 2022 May 10;13:21514593221097608. doi: 10.1177/21514593221097608. PMID: 35573905; PMCID: PMC9096211.
20. Duncan CP, Masri BA. Fractures of the femur after hip replacement. *Instr Course Lect.* 1995;44:293-304. PMID: 7797866.
21. Masri BA, Meek RM, Duncan CP. Periprosthetic fractures evaluation and treatment. *Clin Orthop Relat Res.* 2004 Mar;(420):80-95. doi: 10.1097/00003086-200403000-00012. PMID: 15057082.
22. Chevillotte CJ, Ali MH, Trousdale RTet al. Inflammatory laboratory markers in periprosthetic hip fractures. *J Arthroplasty.* 2009 Aug;24(5):722-7. doi: 10.1016/j.arth.2008.05.026. Epub 2008 Sep 11. PMID: 18789633.
23. Corten K, Vanrykel F, Bellemans J, et al. An algorithm for the surgical treatment of periprosthetic fractures of the femur around a well-fixed femoral component. *J Bone Joint Surg Br.* 2009 Nov;91(11):1424-30. doi: 10.1302/0301-620X.91B11.22292. PMID: 19880884.
24. Unified Classification System for Periprosthetic Fractures (UCPF). *J Orthop Trauma.* 2018 Jan;32 Suppl 1:S141-S144. doi: 10.1097/BOT.0000000000001068. PMID: 29256962.
25. Duncan CP, Haddad FS. The Unified Classification System (UCS): improving our understanding of periprosthetic fractures. *Bone Joint J.* 2014 Jun;96-B (6):713-6. doi: 10.1302/0301-620X.96B6.34040. PMID: 24891568.
26. González-Martín D, País-Brito JL, González-Casamayor S, et al. New Sub-Classification of Vancouver B2 Periprosthetic Hip Fractures According to Fracture Pattern. *Injury.* 2022 Mar;53(3):1218-1224. doi: 10.1016/j.injury.2021.10.026. Epub 2021 Oct 31. PMID: 34749906.
27. Fuller RM, Wicker DI, Christensen CP. The influence of femoral component design on postoperative periprosthetic femoral fracture after uncemented direct anterior total hip arthroplasty in the elderly. *J Orthop.* 2021 May 14;25:207-211. doi: 10.1016/j.jor.2021.05.015. PMID: 34045824; PMCID: PMC8144099.
28. Yun HH, Lee WS, Shin YB, et al. Periprosthetic Occult Femoral Fracture: An Unknown Side Effect of Press-Fit Fixation in Primary Cementless Total Hip Arthroplasty. *Hip Pelvis.* 2023 Jun;35(2):88-98. doi: 10.5371/hp.2023.35.2.88. Epub 2023 Jun 2. PMID: 37323549; PMCID: PMC10264232.
29. Burke JF, Quinlan ND, Werner BC, et al. Osteopetrosis is Associated With an Increased Risk for Intraoperative Periprosthetic Fracture in Total Hip Arthroplasty but not in Total Knee Arthroplasty. *J Arthroplasty.* 2023 Jan;38(1):24-29. doi: 10.1016/j.arth.2022.08.016. Epub 2022 Aug 13. PMID: 35973574.
30. Zeh A, Radetzki F, Diers V, et al. Is there an increased stem migration or compromised osteointegration of the Mayo short-stemmed prosthesis following cerclage wiring of an intrasurgical periprosthetic fracture? *Arch Orthop Trauma Surg.* 2011 Dec;131(12):1717-22. doi: 10.1007/s00402-011-1342-1. Epub 2011 Jun 29. PMID: 21713540.
31. Chappell JD, Lachiewicz PF. Fracture of the femur in revision hip arthroplasty with a fully porous-coated component. *J Arthroplasty.* 2005 Feb;20(2):234-8. doi: 10.1016/j.arth.2004.10.013. PMID: 15902863.

32. Egan KJ, Di Cesare PE. Intraoperative complications of revision hip arthroplasty using a fully porous-coated straight cobalt-chrome femoral stem. *J Arthroplasty*. 1995 Nov;10 Suppl:S45-51. doi: 10.1016/s0883-5403(05)80230-x. PMID: 8776055.
33. Larson JE, Chao EY, Fitzgerald RH. Bypassing femoral cortical defects with cemented intramedullary stems. *J Orthop Res*. 1991 May;9(3):414-21. doi: 10.1002/jor.1100090314. PMID: 2010846.
34. Tsiridis E, Pavlou G, Venkatesh R, et al. Periprosthetic femoral fractures around hip arthroplasty: current concepts in their management. *Hip Int*. 2009 Apr-Jun;19(2):75-86. doi: 10.1177/112070000901900201. PMID: 19462362.
35. Pritchett JW. Fracture of the greater trochanter after hip replacement. *Clin Orthop Relat Res*. 2001 Sep;(390):221-6. doi: 10.1097/00003086-200109000-00025. PMID: 11550869.
36. Van Houtwelingen AP, Duncan CP. The pseudo A(LT) periprosthetic fracture: it's really a B2. *Orthopedics*. 2011 Sep 9;34(9):e479-81. doi: 10.3928/01477447-20110714-27. PMID: 21902137.
37. Kelley SS. Periprosthetic Femoral Fractures. *J Am Acad Orthop Surg*. 1994 May;2(3):164-172. doi: 10.5435/00124635-199405000-00005. PMID: 10709005.
38. Lever JP, Zdero R, Nousiainen MT, et al. The biomechanical analysis of three plating fixation systems for periprosthetic femoral fracture near the tip of a total hip arthroplasty. *J Orthop Surg Res*. 2010 Jul 23;5:45. doi: 10.1186/1749-799X-5-45. PMID: 20653962; PMCID: PMC2914750.
39. Demos HA, Briones MS, White PHet al. A biomechanical comparison of periprosthetic femoral fracture fixation in normal and osteoporotic cadaveric bone. *J Arthroplasty*. 2012 May;27(5):783-8. doi: 10.1016/j.arth.2011.08.019. Epub 2011 Oct 19. PMID: 22014657.
40. Ricci WM, Bolhofner BR, Loftus T, et al. Indirect reduction and plate fixation, without grafting, for periprosthetic femoral shaft fractures about a stable intramedullary implant. Surgical Technique. *J Bone Joint Surg Am*. 2006 Sep;88 Suppl 1 Pt 2:275-82. doi: 10.2106/JBJS.F.00327. PMID: 16951099.
41. Buttaro MA, Farfalli G, Paredes Núñez M, et al. Locking compression plate fixation of Vancouver type-B1 periprosthetic femoral fractures. *J Bone Joint Surg Am*. 2007 Sep;89(9):1964-9. doi: 10.2106/JBJS.F.01224. PMID: 17768193.
42. Ricci WM, Bolhofner BR, Loftus T, et al. Indirect reduction and plate fixation, without grafting, for periprosthetic femoral shaft fractures about a stable intramedullary implant. *J Bone Joint Surg Am*. 2005 Oct;87(10):2240-5. doi: 10.2106/JBJS.D.01911. PMID: 16203889.
43. Sarıyılmaz K, Dikici F, Dikmen G, et al. The effect of strut allograft and its position on Vancouver type B1 periprosthetic femoral fractures: a biomechanical study. *J Arthroplasty*. 2014 Jul;29(7):1485-90. doi: 10.1016/j.arth.2014.02.017. Epub 2014 Feb 21. PMID: 24656637.
44. Wilson D, Frei H, Masri BA, et al. A biomechanical study comparing cortical onlay allograft struts and plates in the treatment of periprosthetic femoral fractures. *Clin Biomech (Bristol, Avon)*. 2005 Jan;20(1):70-6. doi: 10.1016/j.clinbiomech.2004.08.008. PMID: 15567539.
45. González-Martín D, Pais-Brito JL, González-Casamayor S, et al. Treatment algorithm in Vancouver B2 periprosthetic hip fractures: osteosynthesis vs revision arthro-

- lasty. *EFORT Open Rev.* 2022 Aug;4(8):533-541. doi: 10.1530/EOR-21-0129. PMID: 35924638; PMCID: PMC9458940.
- 46. Fink B, Grossmann A, Fuerst M. Distal interlocking screws with a modular revision stem for revision total hip arthroplasty in severe bone defects. *J Arthroplasty.* 2010 Aug;25(5):759-65. doi: 10.1016/j.arth.2009.05.019. Epub 2009 Jul 4. PMID: 19577879.
  - 47. Wu HB, Yan SG, Wu LD, et al. Combined use of extensively porous coated femoral components with onlay cortical strut allografts in revision of Vancouver B2 and B3 periprosthetic femoral fractures. *Chin Med J (Engl).* 2009 Nov 5;122(21):2612-5. PMID: 19951579.
  - 48. Fink B, Grossmann A, Singer J. Hip revision arthroplasty in periprosthetic fractures of vancouver type B2 and B3. *J Orthop Trauma.* 2012 Apr;26(4):206-11. doi: 10.1097/BOT.0b013e318220a94f. PMID: 22011633.
  - 49. Mulay S, Hassan T, Birtwistle S, et al. Management of types B2 and B3 femoral periprosthetic fractures by a tapered, fluted, and distally fixed stem. *J Arthroplasty.* 2005 Sep;20(6):751-6. doi: 10.1016/j.arth.2004.11.020. PMID: 16139712.
  - 50. Ko PS, Lam JJ, Tio MK, et al. Distal fixation with Wagner revision stem in treating Vancouver type B2 periprosthetic femur fractures in geriatric patients. *J Arthroplasty.* 2003 Jun;18(4):446-52. doi: 10.1016/s0883-5403(03)00148-7. PMID: 12820087.
  - 51. Spina M, Rocca G, Canella A, et al. Causes of failure in periprosthetic fractures of the hip at 1- to 14-year follow-up. *Injury.* 2014 Dec;45 Suppl 6:S85-92. doi: 10.1016/j.injury.2014.10.029. Epub 2014 Nov 14. PMID: 25457325.
  - 52. Stoffel K, Blauth M, Joeris A, et al. Fracture fixation versus revision arthroplasty in Vancouver type B2 and B3 periprosthetic femoral fractures: a systematic review. *Arch Orthop Trauma Surg.* 2020 Oct;140(10):1381-1394. doi: 10.1007/s00402-020-03332-7. Epub 2020 Feb 21. PMID: 32086558; PMCID: PMC7505881.
  - 53. Gross AE, Hutchison CR. Proximal femoral allografts for reconstruction of bone stock in revision arthroplasty of the hip. *Orthop Clin North Am.* 1998 Apr;29(2):313-7. doi: 10.1016/s0030-5898(05)70329-1. PMID: 9553576.
  - 54. Ganji R. Challenges of Plate Fixation for Vancouver Type-C fractures after a Well-fixed Hip Arthroplasty Femoral Stem. *Arch Bone Jt Surg.* 2019 Nov;7(6):571-572. PMID: 31970264; PMCID: PMC6935519.
  - 55. Kim YS, Callaghan JJ, Ahn PB, et al. Fracture of the acetabulum during insertion of an oversized hemispherical component. *J Bone Joint Surg Am.* 1995 Jan;77(1):111-7. doi: 10.2106/00004623-199501000-00013. PMID: 7822342.
  - 56. Yun HH, Cheon SH, Im JT, et al. Periprosthetic occult acetabular fracture: an unknown side effect of press-fit techniques in primary cementless total hip arthroplasty. *Eur J Orthop Surg Traumatol.* 2021 Oct;31(7):1411-1419. doi: 10.1007/s00590-021-02894-5. Epub 2021 Feb 13. PMID: 33585969.
  - 57. Callaghan JJ. Periprosthetic fractures of the acetabulum during and following total hip arthroplasty. *Instr Course Lect.* 1998;47:231-5. PMID: 9571423.
  - 58. Callaghan JJ, Kim YS, Pederson DR, et al. Periprosthetic fractures of the acetabulum. *Orthop Clin North Am.* 1999 Apr;30(2):221-34. doi: 10.1016/s0030-5898(05)70077-8. PMID: 10196424.
  - 59. Peterson CA, Lewallen DG. Periprosthetic fracture of the acetabulum after total hip arthroplasty. *J Bone Joint Surg Am.* 1996 Aug;78(8):1206-13. doi: 10.2106/00004623-199608000-00011. PMID: 8753713.

60. Della Valle CJ, Momberger NG, Paprosky WG. Periprosthetic fractures of the acetabulum associated with a total hip arthroplasty. *Instr Course Lect.* 2003;52:281-90. PMID: 12690856.
61. Duncan CP, Haddad FS. Periprosthetic fractures after joint replacement: A unified classification system. In: Schütz M, Perka C, Ruedi TP, ed. *Periprosthetic Fracture Management*. Vol 1. New York, NY: Thieme;10001:2014
62. Mitchell PA, Greidanus NV, Masri BA,et al. The prevention of periprosthetic fractures of the femur during and after total hip arthroplasty. *Instr Course Lect.* 2003;52:301-8. PMID: 12690858.
63. Berry DJ. Identification and management of pelvic discontinuity. *Orthopedics*. 2001 Sep;24(9):881-2. doi: 10.3928/0147-7447-20010901-25. PMID: 11570468.