



BÖLÜM 1

OMUZ EKLEMİ ANATOMİSİ

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GİRİŞ

Omuz, insan vücudunda en fazla serbest hareket edebilen bölgelerden biri olduğu için yapısal ve işlevsel olarak karmaşıktır. Üst ekstremitayı sternoklaviküler eklem yoluyla aksiyel iskelete bağlayan; üç tane kemik ve dört tane eklemden oluşan omuz kompleksini içerir (1,2). Omuz kompleksi klavikula, skapula ve humerus kemikleri ile bu kemikleri içeren sternoklaviküler, akromiyoklaviküler, glenohumeral eklemler ve skapulotorasik artikülasyondan oluşmaktadır (2,3). Bu eklemler, omuz kompleksinin dirsek ile birlikte elin uzayda maksimum düzeyde konumlandırılması için geniş bir hareket aralığına stabilite pahasına izin verir (1,4). Bu durum omuz kompleksinin statik ve dinamik stabilize edici yapılarının bu eklemlere olan desteği ile telafi edilir. Statik stabilize edici yapılar; kemik glenoid, glenoid labrum, glenohumeral bağlar, eklem kapsülü ve negatif eklem içi basıncını içerirken, dinamik stabilize edici yapılar arasında biceps kası tendonunun uzun başı, rotator manşet kasları, rotator interval ve periskapular kaslar bulunur (3-6). Tam hareketlilik, bu stabilize edici yapılar ile birlikte omuz kompleksinin tüm eklemlerinde koordineli, senkronize harekete bağlıdır (4). Hareketlerin verimliliği nöro-

vasküler yapıları ve kasları sararak onlara destek sağlayan fasyalar ile artırılır. Özellikle derin fasya kaslara şekil verir, tutunma yüzeyini artırır ve süspansiyon desteği oluşturur; böylece kasların etkin bir şekilde kasılmasına yardımcı olur (7).

Omuzun tüm bu yapılara bağlı bu yüksek hareket kabiliyeti, bir dezavantaj olarak eklem stabilitesinin bozulmasına katkıda bulunmaktadır, bu yüzden omuz çıkık ve yaralanmalara yatkındır (4). Hem normal hem de patolojik durumları anlamak için omuz eklemine anatomisinin ayrıntılı şekilde anlaşılması gereklidir. Kitabın bu bölümünde anatomik yapılar deri ve kutanöz inervasyon, kemik yapılar, eklem ve ligamentler, kaslar, vasküler yapılar ve brakiyal pleksus başlıkları altında anlatılacaktır.

DERİ VE FASYALAR

Deri

Omuz kuşağının ön yüzündeki tüysüz preaksiyel deri daha ince ve daha hareketliyken, arka yüzündeki postaksiyel deri daha kalındır ve daha az hareketlidir; kaba bağ dokusu lifleri ile alttaki skapulaya

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KAYNAKLAR

1. Miniato MA, Anand P, Varacallo M. Anatomy, Shoulder and Upper Limb, Shoulder. 2021 Jul 31. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30725618.
2. Bakhsh W, Nicandri G. Anatomy and Physical Examination of the Shoulder. *Sports Med Arthrosc Rev.* 2018 Sep;26(3):e10-e22. doi: 10.1097/JSA.000000000000202. PMID: 30059442.
3. Halder AM, Itoi E, An KN. Anatomy and biomechanics of the shoulder. *Orthop Clin North Am.* 2000 Apr;31(2):159-76. doi: 10.1016/s0030-5898(05)70138-3. PMID: 10736387.
4. Culham E, Peat M. Functional anatomy of the shoulder complex. *J Orthop Sports Phys Ther.* 1993 Jul;18(1):342-50. doi: 10.2519/jospt.1993.18.1.342. PMID: 8348135.
5. Chang LR, Anand P, Varacallo M. Anatomy, Shoulder and Upper Limb, Glenohumeral Joint. 2021 Aug 11. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30725703.
6. Peter H. Seidenberg, Anthony I. Beutler, Chapter 21 - Injuries of the Shoulder and Arm, Editor(s): Peter H. Seidenberg, Anthony I. Beutler, The Sports Medicine Resource Manual, W.B. Saunders, 2008, Pages 233-252, ISBN 9781416031970, <https://doi.org/10.1016/B978-141603197-0.10021-7>.
7. Gatt A, Agarwal S, Zito PM. Anatomy, Fascia Layers. 2021 Jul 26. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30252294.
8. Birch R, Tunstall R Pectoral girdle and upper limb: overview and surface anatomy In: Standring S (ed.) *Gray's Anatomy The Anatomical Basis of Clinical Practice.* 41st ed. Elsevier Limited; 2016 p.797-798
9. Birch R, Tunstall R Pectoral girdle and upper limb: overview and surface anatomy In: Standring S (ed.) *Gray's Anatomy The Anatomical Basis of Clinical Practice.* 41st ed. Elsevier Limited; 2016 p.776-793
10. Baglien P, Varacallo M. Anatomy, Shoulder and Upper Limb, Cutaneous Innervation. 2021 Jul 26. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 31424833.
11. Lambert SM Shoulder girdle and arm In: Standring S (ed.) *Gray's Anatomy The Anatomical Basis of Clinical Practice.* 41st ed. Elsevier Limited; 2016 p.799-807
12. Hyland S, Charllick M, Varacallo M. Anatomy, Shoulder and Upper Limb, Clavicle. 2021 Jul 26. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30252246.
13. Bernat A, Huysmans T, Van Glabbeek F, Sijbers J, Gielen J, Van Tongel A. The anatomy of the clavicle: a three-dimensional cadaveric study. *Clin Anat.* 2014 Jul;27(5):712-23. doi: 10.1002/ca.22288. Epub 2013 Oct 21. PMID: 24142486.
14. Bentley TP, Hosseinzadeh S. Clavicle Fractures. 2022 Aug 1. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 29939669.
15. van der Meijden OA, Gaskill TR, Millett PJ. Treatment of clavicle fractures: current concepts review. *J Shoulder Elbow Surg.* 2012 Mar;21(3):423-9. doi: 10.1016/j.jse.2011.08.053. Epub 2011 Nov 6. PMID: 22063756.
16. Miniato MA, Mudreac A, Borger J. Anatomy, Thorax, Scapula. 2022 Jul 25. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30855903.
17. Goldstein B. Shoulder anatomy and biomechanics. *Phys Med Rehabil Clin N Am.* 2004 May;15(2):313-49. doi: 10.1016/j.pmr.2003.12.008. PMID: 15145421.
18. Moccia D, Nackashi AA, Schilling R, Ward PJ. Fascial bundles of the infraspinatus fascia: anatomy, function, and clinical considerations. *J Anat.* 2016 Jan;228(1):176-83. doi: 10.1111/joa.12386. Epub 2015 Sep 25. PMID: 26403802; PMCID: PMC4694164.
19. Prescher A. Anatomical basics, variations, and degenerative changes of the shoulder joint and shoulder girdle. *Eur J Radiol.* 2000 Aug;35(2):88-102. doi: 10.1016/s0720-048x(00)00225-4. PMID: 10963915.
20. Hrdlička, A. (1942), The scapula: Visual observations *American Journal of Physical Anthropology* 29:73-94 <https://doi.org/10.1002/ajpa.1330290107>
21. Pouliart N, Gagey O. Significance of the latissimus dorsi for shoulder instability. I. Variations in its anatomy around the humerus and scapula. *Clin Anat.* 2005 Oct;18(7):493-9. doi: 10.1002/ca.20185. PMID: 16092134.
22. Didesch JT, Tang P. Anatomy, Etiology, and Management of Scapular Winging. *J Hand Surg Am.* 2019 Apr;44(4):321-330. doi: 10.1016/j.jhsa.2018.08.008. Epub 2018 Oct 3. PMID: 30292717.
23. Rothenberg A, Gasbarro G, Chlebeck J, Lin A. The Coracoacromial Ligament: Anatomy, Function, and Clinical Significance. *Orthop J Sports Med.* 2017 Apr 27;5(4):2325967117703398. doi: 10.1177/2325967117703398. PMID: 28508008; PMCID: PMC5415041.
24. Bigliani LU, Morrison DS, April EW. The morphology of the acromion and its relationship to rotator cuff tears. *Orthopaedic Transactions* 1986; 10: 228.
25. Gagey N, Ravaud E, Lassau JP. 1993. Anatomy of the acromial arch: Correlation of anatomy and magnetic resonance imaging. *Surg Radiol Anat* 15:63-70.
26. Natsis K, Tsikaras P, Totlis T, Gigis I, Skandalakis P, Appell HJ, Koebeke J. Correlation between the four types of acromion and the existence of enthesophytes: a study on 423 dried scapulas and review of the literature. *Clin Anat.* 2007 Apr;20(3):267-72. doi: 10.1002/ca.20320. PMID: 16683236.
27. Li CH, Skalski MR, Matcuk GR Jr, Patel DB, Gross JS, Tomasian A, White EA. Coracoid process fractures: anatomy, injury patterns, multimodality imaging, and approach to management. *Emerg Radiol.* 2019 Aug;26(4):449-458. doi: 10.1007/s10140-019-01683-2. Epub 2019 Mar 25. PMID: 30911959.

28. Capo JT, Criner KT, Shامian B. Exposures of the humerus for fracture fixation. *Hand Clin.* 2014 Nov;30(4):401-14. v. doi: 10.1016/j.hcl.2014.07.001. Epub 2014 Oct 23. PMID: 25440069.
29. Mostafa E, Imonugo O, Varacallo M. Anatomy, Shoulder and Upper Limb, Humerus. 2022 Aug 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30521242.
30. Clavert P. Glenoid labrum pathology. *Orthop Traumatol Surg Res.* 2015 Feb;101(1 Suppl):S19-24. doi: 10.1016/j.otsr.2014.06.028. Epub 2015 Jan 14. PMID: 25596985.
31. Almajed YA, Hall AC, Gillingwater TH, Alashkham A. Anatomical, functional and biomechanical review of the glenoid labrum. *J Anat.* 2022 Apr;240(4):761-771. doi: 10.1111/joa.13582. Epub 2021 Nov 1. PMID: 34725812; PMCID: PMC8930820.
32. Lambert SM. Shoulder girdle and arm In: Standring S (ed.) *Gray's Anatomy The Anatomical Basis of Clinical Practice.* 41st ed. Elsevier Limited; 2016 p.808-816
33. Cole BJ, Rodeo SA, O'Brien SJ, Altchek D, Lee D, DiCarlo EF, Potter H. The anatomy and histology of the rotator interval capsule of the shoulder. *Clin Orthop Relat Res.* 2001 Sep;390(1):129-37. doi: 10.1097/00003086-200109000-00015. PMID: 11550858.
34. Wilson WR, Magnussen RA, Irribarra LA, Taylor DC. Variability of the capsular anatomy in the rotator interval region of the shoulder. *J Shoulder Elbow Surg.* 2013 Jun;22(6):856-61. doi: 10.1016/j.jse.2012.08.024. Epub 2012 Nov 22. PMID: 23177168.
35. Peat M. Functional anatomy of the shoulder complex. *Phys Ther.* 1986 Dec;66(12):1855-65. doi: 10.1093/ptj/66.12.1855. PMID: 3786416.
36. Fox AJS, Fox OJK, Schär MO, Chaudhury S, Warren RF, Rodeo SA. The glenohumeral ligaments: Superior, middle, and inferior: Anatomy, biomechanics, injury, and diagnosis. *Clin Anat.* 2021 Mar;34(2):283-296. doi: 10.1002/ca.23717. Epub 2021 Jan 13. PMID: 33386636.
37. Fanghänel, J., Pera, F., Anderhuber, F., Nitsch, R., & Waldeyer, A. (2003). In A. Waldeyer, & A. Mayet (Eds.), *Anatomie des Menschen. de Gruyter. Anatomie des Menschen (17th ed.)*. Berlin, New York: Walterde Gruyter.
38. Thiel, W. (1999). *Photographic atlas of practical anatomy II (2nd ed.)*. Heidelberg: Springer.
39. Burkhart SS, De Beer JF. Traumatic glenohumeral bone defects and their relationship to failure of arthroscopic Bankart repairs: significance of the inverted-pear glenoid and the humeral engaging Hill-Sachs lesion. *Arthroscopy.* 2000 Oct;16(7):677-94. doi: 10.1053/jars.2000.17715. PMID: 11027751.
40. Clark JM, Harryman DT 2nd. Tendons, ligaments, and capsule of the rotator cuff. *Gross and microscopic anatomy. J Bone Joint Surg Am.* 1992 Jun;74(5):713-25. PMID: 1624486.
41. Kolts, I., Busch, L. C., Tomusk, H., Raudheiding, A., Eller, A., Merila, M., ... Kühnel, W. (2002). Macroscopical anatomy of the so-called "rotator interval". A cadaver study on 19 shoulder joints. *Annals of Anatomy,* 184, 9-14.
42. Choi CH, Kim SS, Kim SJ, Lee JH. Arthroscopic Changes of the Biceps Pulley in Rotator Cuff Tear and Its Clinical Significance in Relation to Treatment. *Clin Orthop Surg.* 2015 Sep;7(3):365-71. doi: 10.4055/cios.2015.7.3.365. Epub 2015 Aug 13. PMID: 26330960; PMCID: PMC4553286.
43. Warner JJ, Deng XH, Warren RF, Torzilli PA. Static capsuloligamentous restraints to superior-inferior translation of the glenohumeral joint. *Am J Sports Med.* 1992 Nov-Dec;20(6):675-85. doi: 10.1177/036354659202000608. PMID: 1456361.
44. Williams MM, Snyder SJ, Buford D Jr. The Buford complex--the "cord-like" middle glenohumeral ligament and absent anterosuperior labrum complex: a normal anatomic capsulolabral variant. *Arthroscopy.* 1994 Jun;10(3):241-7. doi: 10.1016/s0749-8063(05)80105-7. PMID: 8086014.
45. Pradhan RL, Itoi E, Watanabe W, Yamada S, Nagasawa H, Shimizu T, Wakabayashi I, Sato K. A rare anatomic variant of the superior glenohumeral ligament. *Arthroscopy.* 2001 Jan;17(1):E3. doi: 10.1053/jars.2001.17993. PMID: 11154383.
46. O'Brien SJ, Neves MC, Arnoczky SP, Rozbruch SR, DiCarlo EF, Warren RF, Schwartz R, Wickiewicz TL. The anatomy and histology of the inferior glenohumeral ligament complex of the shoulder. *Am J Sports Med.* 1990 Sep-Oct;18(5):449-56. doi: 10.1177/036354659001800501. PMID: 2252083.
47. Soslowsky LJ, Malicky DM, Blasler RB. Active and passive factors in inferior glenohumeral stabilization: a biomechanical model. *J Shoulder Elbow Surg.* 1997 Jul-Aug;6(4):371-9. doi: 10.1016/s1058-2746(97)90005-7. PMID: 9285877.
48. Wong M, Kiel J. Anatomy, Shoulder and Upper Limb, Acromioclavicular Joint. 2022 Jul 25. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 29763033.
49. Nakazawa M, Nimura A, Mochizuki T, Koizumi M, Sato T, Akita K. The Orientation and Variation of the Acromioclavicular Ligament: An Anatomic Study. *Am J Sports Med.* 2016 Oct;44(10):2690-2695. doi: 10.1177/0363546516651440. Epub 2016 Jun 17. PMID: 27315820.
50. Marsalli M, Moran N, Laso JI. Arthroscopic Acromioclavicular Joint Reconstruction With TightRope and FiberTape Loop. *Arthrosc Tech.* 2018 Oct 8;7(11):e1103-e1108. doi: 10.1016/j.eats.2018.07.005. PMID: 30533355; PMCID: PMC6261064.
51. Lee SJ, Yoo YS, Kim YS, Jang SW, Kim J, Kim SJ, Kim BS, Jung KH, Varshney A. Arthroscopic Coracoclavicular Fixation Using Multiple Low-Profile Devices in Acute Acromioclavicular Joint Dislocation. *Arthroscopy.* 2019 Jan;35(1):14-21. doi: 10.1016/j.arthro.2018.07.007. Epub 2018 Nov 16. PMID: 30455087.
52. Epperson TN, Varacallo M. Anatomy, Shoulder and Upper Limb, Sternoclavicular Joint. 2022 Jul 25. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30725943.

53. Aaron J. Bois, Michael A. Wirth, Charles A. Rockwood, Chapter 10 - Disorders of the Sternoclavicular Joint, Editor(s): Charles A. Rockwood, Frederick A. Matsen, Michael A. Wirth, Steven B. Lippitt, Edward V. Fehring, John W. Sperling, Rockwood and Matsen's the Shoulder (Fifth Edition), Elsevier, 2017, Pages 453-491.e4, ISBN 9780323297318, <https://doi.org/10.1016/B978-0-323-29731-8.00010-6>.
54. Osias W, Matcuk GR Jr, Skalski MR, Patel DB, Schein AJ, Hatch GFR, White EA. Scapulothoracic pathology: review of anatomy, pathophysiology, imaging findings, and an approach to management. *Skeletal Radiol*. 2018 Feb;47(2):161-171. doi: 10.1007/s00256-017-2791-6. Epub 2017 Oct 26. PMID: 29075809.
55. Williams GR Jr, Shakil M, Klimkiewicz J, Iannotti JP. Anatomy of the scapulothoracic articulation. *Clin Orthop Relat Res*. 1999 Feb;(359):237-46. doi: 10.1097/00003086-199902000-00027. PMID: 10078149.
56. Zhang M, Zhou JJ, Zhang YM, Wang JH, Zhang QY, Chen W. Clinical Effectiveness of Scapulothoracic Joint Control Training Exercises on Shoulder Joint Dysfunction. *Cell Biochem Biophys*. 2015 May;72(1):83-7. doi: 10.1007/s12013-014-0408-4. PMID: 25416584.
57. Frank RM, Ramirez J, Chalmers PN, McCormick FM, Romeo AA. Scapulothoracic anatomy and snapping scapula syndrome. *Anat Res Int*. 2013;2013:635628. doi: 10.1155/2013/635628. Epub 2013 Nov 28. PMID: 24369502; PMCID: PMC3863500.
58. Lambert SM Shoulder girdle and arm In: Standring S (ed.) *Gray's Anatomy The Anatomical Basis of Clinical Practice*. 41st ed. Elsevier Limited; 2016 p.816-833
59. McCausland C, Sawyer E, Eovaldi BJ, Varacallo M. Anatomy, Shoulder and Upper Limb, Shoulder Muscles. 2022 Aug 8. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30521257.
60. Baig MA, Bordoni B. Anatomy, Shoulder and Upper Limb, Pectoral Muscles. 2022 Aug 30. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 31424825.
61. Kyriacou H, Khan YS. Anatomy, Shoulder and Upper Limb, Axillary Lymph Nodes. 2022 Jul 25. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 32644614.
62. Bayot ML, Nassereddin A, Varacallo M. Anatomy, Shoulder and Upper Limb, Brachial Plexus. 2022 Jul 25. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 29763192.
63. Polcaro L, Charlick M, Daly DT. Anatomy, Head and Neck, Brachial Plexus. 2022 Aug 22. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 30285368.
64. Aheer GK, Villella J. Scalenus muscle and the C5 root of the brachial plexus: bilateral anatomical variation and its clinical significance. *J Can Chiropr Assoc*. 2021 Aug;65(2):229-233. PMID: 34658395; PMCID: PMC8480370.