

Wolff's Simplification and the Human Proximal Femur References

These are the references from the literature review of our ORS 2023 abstract entitled "Wolff's Simplification Persists: The Unfortunate Historical View that the Proximal Human Femur is a Cantilever Beam", by Jamison K Walker, Brett W. Richards, John T. Cronin, John G. Skedros.

(Wolff, 1892; Albert, 1900; Walkoff, 1904; Dixon, 1910; Keith, 1919; Jansen, 1920; Carey, 1929; Farkas et al., 1948; Bechtol, 1952; Brodetti and Hirsch, 1956; Backman, 1957; Smyth, 1958; Garden, 1961; Hall, 1961; Devas, 1965; Singh et al., 1970; Morris, 1971; Williams and Svensson, 1971; Rybicki et al., 1972; Rydell, 1973; Black, 1974; Dequeker et al., 1974; Barbieri and Buoncristiani, 1975; Pauwels, 1976; Martin and Atkinson, 1977; Valliappan et al., 1977; Mayer, 1978; Oh and Harris, 1978; Brown et al., 1980; Schatzker and Waddell, 1980; Bombelli, 1983; Rosenthal and Scott, 1983; Brown and DiGioia, 1984; DeLee, 1984; Frankel and Pugh, 1984; Harty, 1984; Mizrahi et al., 1984; Poss, 1984; Schatzker, 1984; Fazzalari et al., 1985; Maquet, 1985; Meyers, 1985; Moore, 1985; Aggarwal et al., 1986; Kerr et al., 1986; Kapandji, 1987; Resnik et al., 1987; Venieratos et al., 1987; Fullerton and Snowdy, 1988; Greenspan, 1988; Lovejoy, 1988; Resnick and Niwayama, 1988; Woolf and Dixon, 1988; Carter et al., 1989; Cummings and Nevitt, 1989; Fazzalari et al., 1989; Stulberg et al., 1989; Vander Sloten and Van der Perre, 1989; Williams, 1989; Beck et al., 1990; Crane et al., 1990; Francillon-Vieillot et al., 1990; Johansson et al., 1990; Keyak et al., 1990; Laros, 1990; Lotz et al., 1990; Tachdijan, 1990; Finlay et al., 1991; Kawashima and Uhthoff, 1991; Latta, 1991; Lotz et al., 1991a, 1991b; Schatzker, 1991; Berquist and Coventry, 1992; Callaghan, 1992; Parke, 1992; Kummer, 1993; Neville, 1993; Kyle, 1994; Van Audekercke and Van der Perre, 1994; Elke et al., 1995; Laroche et al., 1995; Lotz et al., 1995; Martini, 1995; Monteleone, 1995; Ling et al., 1996; Mautalen et al., 1996; Miller, 1996; Mourtada et al., 1996; Bagi et al., 1997; Duda et al., 1997; Gibson and Ashby, 1997; Maitra and Johnson, 1997; Pidaparti and Turner, 1997; Shin and Gillingham, 1997; Duda et al., 1998; Egol et al., 1998; Ganey and Odgen, 1998; Rafferty, 1998; Bell et al., 1999; Cordey and Gautier, 1999; Lim et al., 1999; Skedros et al., 1999; Boden and Osbahr, 2000; Demes et al., 2000; Jordan et al., 2000; Boden et al., 2001; Crabtree et al., 2001; Baumgaertner and Higgins, 2002; Fetto et al., 2002; Hughes et al., 2002; Kalmey and Lovejoy, 2002; Koval and Zuckerman, 2002; Miller et al., 2002; Knothe Tate, 2003; Sanderlin and Raspa, 2003; Lehman and Shah, 2004; Loveridge and Reeve, 2004; Oxnard, 2004; Provencher et al., 2004; Voo et al., 2004; Keyak et al., 2005; Lovejoy, 2005; Mayhew et al., 2005; Power et al., 2005; Schatzker, 2005; Fredericson et al., 2006; Pihlajamaki et al., 2006; Rudman et al., 2006; Ryan and Krovitz, 2006; Skerry, 2006; Kaptoge et al., 2007; Rossi and Wendling-Mansuy, 2007; Edwards et al., 2008; Jang and Kim, 2008; Cristofolini et al., 2009; de Bakker et al., 2009; Fratzl-Zelman et al., 2009; Lee et al., 2009; Cristofolini et al., 2010; Djuric et al., 2010; Hammer, 2010; Sverdlova and Witzel, 2010; Beckmann et al., 2011; Boyle and Kim, 2011; Lau et al., 2011; Skedros, 2011; von Meyer, 2011; Djurić et al., 2012; Anderson and Madigan, 2013; Behrens et al., 2013; Ruff and Higgins, 2013; Qian et al., 2014; Reeve and Loveridge, 2014; Hammer, 2015; Nawathe et al., 2015; Sheehan et al., 2015; Geraldles et al., 2016; McInnis and Ramey, 2016; Oliveira et al., 2016; Petrin et al., 2016; Ruff et al., 2016; Hammer, 2017; Martelli, 2017; Robertson and Wood, 2017; Ruff, 2017; Cazenave, 2018; Deng et al., 2018;

Patel et al., 2018; Pellikaan et al., 2018; Steele et al., 2018; Cazenave et al., 2019; Daly et al., 2019; Friedl et al., 2019; Georgiou et al., 2019; Hammer, 2019; Simpson et al., 2019; Martelli et al., 2020; Rooney et al., 2020; Tomar et al., 2020; Warden et al., 2020; Cazenave et al., 2021; Deng et al., 2021; Kolaczko et al., 2021; Bernstein et al., 2022; Cazenave et al., 2022; Kiel and Kaiser, 2022; Rooney et al., 2022; Shaw et al., 2022)

- Aggarwal ND, Singh GD, Aggarwal R, Kaur RP, Thapar SP. 1986. A survey of osteoporosis using the calcaneum as an index. *Int Orthop* 10:147-153.
- Albert E. 1900. Einführung in das Studium der Architektur der Röhrenknochen: Alfred Hölder.
- Anderson DE, Madigan ML. 2013. Effects of age-related differences in femoral loading and bone mineral density on strains in the proximal femur during controlled walking. *J Appl Biomech* 29:505-516.
- Backman S. 1957. Chapter VI: Calculation of the state of stress in the femoral neck. *Acta Radiologica* 47(suppl 146):66-94.
- Bagi CM, Wilkie D, Georgelos K, Williams D, Bertolini D. 1997. Morphological and structural characteristics of the proximal femur in human and rat. *Bone* 21:261-267.
- Barbieri L, Buoncristiani I. 1975. [Considerations on some problems of osseous physiopathology in relation to a photoelastic study of the femur]. *Chir Organi Mov* 62:201-208.
- Baumgaertner M, Higgins T. 2002. Femoral neck fractures. In: JD BRaH, editor. *Rockwood and Green's Fractures in Adults, 5th ed.* Philadelphia: Lippincott Williams and Wilkins. p 1579-1634.
- Bechtol C. 1952. Engineering principles applied to orthopaedic surgery. *Am Acad Orthop Surg Instr Course Lect* 9:257-264.
- Beck TJ, Ruff CB, Warden KE, Scott WW, Gopala U. 1990. Predicting femoral neck strength from bone mineral data: A structural approach. *Investigative Radiology* 25:6-18.
- Beckmann J, Springorum R, Vettorazzi E, Bachmeier S, Luring C, Tingart M, Puschel K, Stark O, Grifka J, Gehrke T, Amling M, Gebauer M. 2011. Fracture prevention by femoroplasty--cement augmentation of the proximal femur. *J Orthop Res* 29:1753-1758.
- Behrens SB, Deren ME, Matson A, Fadale PD, Monchik KO. 2013. Stress fractures of the pelvis and legs in athletes: a review. *Sports Health* 5:165-174.
- Bell KL, Loveridge N, Power J, Garrahan N, Meggitt BF, Reeve J. 1999. Regional differences in cortical porosity in the fractured femoral neck. *Bone* 24:57-64.
- Bernstein EM, Kelsey TJ, Cochran GK, Deafenbaugh BK, Kuhn KM. 2022. Femoral neck stress fractures: an updated review. *J Am Acad Orthop Surg* 30:302-311.
- Berquist TH, Coventry MB. 1992. The pelvis and hips. In: Berquist TH, editor. *Imaging of Orthopedic Trauma.* Philadelphia: W.B. Saunders Co. p 207-310.
- Black J. 1974. Failure of implants for internal hip fixation. *Orthop Clin North Am* 5:833-845.
- Boden BP, Osbahr DC. 2000. High-risk stress fractures: evaluation and treatment. *J Am Acad Orthop Surg* 8:344-353.
- Boden BP, Osbahr DC, Jimenez C. 2001. Low-risk stress fractures. *Am J Sports Med* 29:100-111.
- Bombelli R. 1983. Biomechanics of the normal static and dynamic hip. In: *Osteoarthritis of the hip:* Springer. p 13-65.
- Boyle C, Kim IY. 2011. Three-dimensional micro-level computational study of Wolff's law via trabecular bone remodeling in the human proximal femur using design space topology optimization. *J Biomech* 44:935-942.

- Brodetti A, Hirsch C. 1956. Methods of studying some mechanical properties of bone tissue. *Acta Orthop Scand* 26:1-14.
- Brown TD, DiGioia AM. 1984. A contact-coupled finite element analysis of the natural adult hip. *J Biomech* 17:437-448.
- Brown TD, Way ME, Fu FH, Ferguson AB, Jr. 1980. Load transmission through the proximal femur of the growing child: a finite element analysis. *Growth* 44:301-317.
- Callaghan JJ. 1992. Intracapsular femoral neck fractures. London: Lea and Febiger.
- Carey EJ. 1929. Studies in the dynamics of histogenesis. *Radiology* 13:127-168.
- Carter DR, Orr TE, Fyhrie DP. 1989. Relationships between loading history and femoral cancellous bone architecture. *J Biomech* 22:231-244.
- Cazenave M. 2018. Caractérisation multi-site de la distribution osseuse corticale et de l'organisation du réseau trabéculaire du squelette postcrânien de *Paranthropus robustus*: implications taxonomiques, fonctionnelles et paléobiologiques: University of Kent (United Kingdom).
- Cazenave M, Braga J, Oettle A, Pickering TR, Heaton JL, Nakatsukasa M, Thackeray JF, de Beer F, Hoffman J, Dumoncel J, Macchiarelli R. 2019. Cortical bone distribution in the femoral neck of *Paranthropus robustus*. *J Hum Evol* 135:102666.
- Cazenave M, Kivell TL, Pina M, Begun DR, Skinner MM. 2022. Calcar femorale variation in extant and fossil hominids: Implications for identifying bipedal locomotion in fossil hominins. *J Hum Evol* 167:103183.
- Cazenave M, Oettle A, Pickering TR, Heaton JL, Nakatsukasa M, Francis Thackeray J, Hoffman J, Macchiarelli R. 2021. Trabecular organization of the proximal femur in *Paranthropus robustus*: Implications for the assessment of its hip joint loading conditions. *J Hum Evol* 153:102964.
- Cordey J, Gautier E. 1999. Strain gauges used in the mechanical testing of bones. Part I: Theoretical and technical aspects. *Injury* 30 Suppl 1:A7-13.
- Crabtree N, Loveridge N, Parker M, Rushton N, Power J, Bell KL, Beck TJ, Reeve J. 2001. Intracapsular hip fracture and the region-specific loss of cortical bone: analysis by peripheral quantitative computed tomography. *J Bone Miner Res* 16:1318-1328.
- Crane GJ, Fazzalari NL, Parkinson IH, Vernon-Roberts B. 1990. Age-related changes in femoral trabecular bone in arthrosis. *Acta Orthop Scand* 61:421-426.
- Cristofolini L, Conti G, Juszczuk M, Cremonini S, Van Sint Jan S, Viceconti M. 2010. Structural behaviour and strain distribution of the long bones of the human lower limbs. *J Biomech* 43:826-835.
- Cristofolini L, Juszczuk M, Taddei F, Viceconti M. 2009. Strain distribution in the proximal human femoral metaphysis. *Proc Inst Mech Eng H* 223:273-288.
- Cummings SR, Nevitt MC. 1989. A hypothesis: the causes of hip fractures. *J Gerontol* 44:M107-111.
- Daly RM, Dalla Via J, Duckham RL, Fraser SF, Helge EW. 2019. Exercise for the prevention of osteoporosis in postmenopausal women: an evidence-based guide to the optimal prescription. *Braz J Phys Ther* 23:170-180.
- de Bakker PM, Manske SL, Ebacher V, Oxland TR, Cripton PA, Guy P. 2009. During sideways falls proximal femur fractures initiate in the superolateral cortex: evidence from high-speed video of simulated fractures. *J Biomech* 42:1917-1925.
- DeLee J. 1984. Fractures and dislocations of the hip. *Fractures in adults* 2:1211-1356.
- Demes B, Jungers WL, Walker C. 2000. Cortical bone distribution in the femoral neck of strepsirhine primates. *J Hum Evol* 39:367-379.
- Deng C, Gillette JC, Derrick TR. 2018. Femoral neck stress in older adults during stair ascent and descent. *J Appl Biomech* 34:191-198.
- Deng C, Gillette JC, Derrick TR. 2021. Measuring femoral neck loads in healthy young and older adults during stair ascent and descent. *PLoS One* 16:e0245658.
- Dequeker J, Gautama K, Roh YS. 1974. Femoral trabecular patterns in asymptomatic spinal osteoporosis and femoral neck fracture. *Clin Radiol* 25:243-246.
- Devas MB. 1965. Stress fractures of the femoral neck. *J Bone Joint Surg Br* 47:728-738.

- Dixon AF. 1910. The Architecture of the Cancellous Tissue forming the Upper End of the Femur. *J Anat Physiol* 44:223-230 221.
- Djuric M, Djonic D, Milovanovic P, Nikolic S, Marshall R, Marinkovic J, Hahn M. 2010. Region-specific sex-dependent pattern of age-related changes of proximal femoral cancellous bone and its implications on differential bone fragility. *Calcif Tissue Int* 86:192-201.
- Djurić M, Milovanović P, Djonić D, Minić A, Hahn M. 2012. Morphological characteristics of the developing proximal femur: a biomechanical perspective. *Srpski Arhiv Za Celokupno Lekarstvo* 140:738-745.
- Duda GN, Heller M, Albinger J, Schulz O, Schneider E, Claes L. 1998. Influence of muscle forces on femoral strain distribution. *J Biomech* 31:841-846.
- Duda GN, Schneider E, Chao EY. 1997. Internal forces and moments in the femur during walking. *J Biomech* 30:933-941.
- Edwards WB, Gillette JC, Thomas JM, Derrick TR. 2008. Internal femoral forces and moments during running: implications for stress fracture development. *Clin Biomech (Bristol, Avon)* 23:1269-1278.
- Egol KA, Koval KJ, Kummer F, Frankel VH. 1998. Stress fractures of the femoral neck. *Clin Orthop Relat Res*:72-78.
- Elke RP, Cheal RJ, Simmons C, Poss R. 1995. Three-dimensional anatomy of the cancellous structures within the proximal femur from computed tomography data. *J Orthop Res* 13:513-523.
- Farkas A, Milton MJ, Hayner JC. 1948. An anatomical study of the mechanics, pathology, and healing of fracture of the femoral neck. *JBJS* 30:53-69.
- Fazzalari NL, Crisp DJ, Vernon-Roberts B. 1989. Mathematical modeling of trabecular bone structure: The evaluation of analytical and quantified surface to volume relationships in the femoral head and iliac crest. *J Biomech* 22:901-910.
- Fazzalari NL, Darracott J, Vernon-Roberts B. 1985. Histomorphometric changes in the trabecular structure of a selected stress region in the femur in patients with osteoarthritis and fracture of the femoral neck. *Bone* 6:125-133.
- Fetto J, Leali A, Moroz A. 2002. Evolution of the Koch model of the biomechanics of the hip: clinical perspective. *J Orthop Sci* 7:724-730.
- Finlay JB, Chess DG, Hardie WR, Rorabeck CH, Bourne RB. 1991. An evaluation of three loading configurations for the *in vitro* testing of femoral strains in total hip arthroplasty. *J Orthop Res* 9:749-759.
- Francillon-Vieillot H, de Buffrénil V, Castanet J, Géraudie J, Meunier F, Sire J, Zylberberg L, de Ricqlès A. 1990. Microstructure and mineralization of vertebrate skeletal tissues. In: Carter J, editor. *Skeletal Biomineralization: Patterns, Processes and Evolutionary Trends*. New York: Van Nostrand Reinhold. p 471-530.
- Frankel VH, Pugh JW. 1984. Biomechanics of the hip. In: *Surgery of the hip joint*, 2nd ed: Springer. p 115-131.
- Fratzl-Zelman N, Roschger P, Gourrier A, Weber M, Misof BM, Loveridge N, Reeve J, Klaushofer K, Fratzl P. 2009. Combination of nanoindentation and quantitative backscattered electron imaging revealed altered bone material properties associated with femoral neck fragility. *Calcif Tissue Int* 85:335-343.
- Fredericson M, Jennings F, Beaulieu C, Matheson GO. 2006. Stress fractures in athletes. *Top Magn Reson Imaging* 17:309-325.
- Friedl L, Claxton AG, Walker CS, Churchill SE, Holliday TW, Hawks J, Berger LR, DeSilva JM, Marchi D. 2019. Femoral neck and shaft structure in *Homo naledi* from the Dinaledi Chamber (Rising Star System, South Africa). *J Hum Evol* 133:61-77.
- Fullerton LR, Jr., Snowdy HA. 1988. Femoral neck stress fractures. *Am J Sports Med* 16:365-377.
- Ganey TM, Odgen JA. 1998. Pre- and post-natal development of the hip. In: Callaghan JJ, Rosenbery AG, Rubash HE, editors. *The adult hip*. Philadelphia: Lippincott-Raven Publishers. p 39-55.

- Garden RS. 1961. The structure and function of the proximal end of the femur. *J Bone Joint Surg* 43-B:576-589.
- Georgiou L, Kivell TL, Pahr DH, Buck LT, Skinner MM. 2019. Trabecular architecture of the great ape and human femoral head. *J Anat* 234:679-693.
- Geraldes DM, Modenese L, Phillips ATM. 2016. Consideration of multiple load cases is critical in modelling orthotropic bone adaptation in the femur. *Biomech Model Mechanobiol* 15:1029-1042.
- Gibson LJ, Ashby MF. 1997. Cancellous bone. In: Clarke DR, Suresh S, Ward IM, editors. *Cellular solids: Structure and properties*, 2nd ed. Cambridge, United Kingdom: Cambridge University Press. p 429-452.
- Greenspan A. 1988. *Orthopaedic radiology: A practical approach*. Philadelphia: JB Lippincott.
- Hall MC. 1961. The trabecular patterns of the neck of the femur with particular reference to changes in osteoporosis. *Can Med Assoc J* 85:1141-1144.
- Hammer A. 2010. The structure of the femoral neck: A physical dissection with emphasis on the internal trabecular system. *Ann Anat* 192:168-177.
- Hammer A. 2015. The paradox of Wolff's theories. *Ir J Med Sci* 184:13-22.
- Hammer A. 2017. Wolff: straight not curved. *Ir J Med Sci* 186:939-946.
- Hammer A. 2019. The calcar femorale: A new perspective. *J Orthop Surg (Hong Kong)* 27:2309499019848778.
- Harty M. 1984. *The anatomy of the hip joint*, 2nd ed. New York: Springer-Verlag.
- Hughes PE, Hsu JC, Matava MJ. 2002. Hip anatomy and biomechanics in the athlete. *Sports medicine and arthroscopy review* 10:103-114.
- Jang IG, Kim IY. 2008. Computational study of Wolff's law with trabecular architecture in the human proximal femur using topology optimization. *J Biomech* 41:2353-2361.
- Jansen M. 1920. *On Bone Formation: Its Relation to Tension and Pressure*. London: Manchester University Press, Longmans, Green and Co.
- Johansson C, Ekenman I, Tornkvist H, Eriksson E. 1990. Stress fractures of the femoral neck in athletes. The consequence of a delay in diagnosis. *Am J Sports Med* 18:524-528.
- Jordan GR, Loveridge N, Bell KL, Power J, Rushton N, Reeve J. 2000. Spatial clustering of remodeling osteons in the femoral neck cortex: A cause of weakness in hip fracture? *Bone* 26:305-313.
- Kalmey JK, Lovejoy CO. 2002. Collagen fiber orientation in the femoral necks of apes and humans: Do their histological structures reflect differences in locomotor loading? *Bone* 31:327-332.
- Kapandji I. 1987. *The Physiology of Joints: Lower Limb*. Edinburgh: Churchill Livingstone.
- Kaptoge S, Jakes RW, Dalzell N, Wareham N, Khaw KT, Loveridge N, Beck TJ, Reeve J. 2007. Effects of physical activity on evolution of proximal femur structure in a younger elderly population. *Bone* 40:506-515.
- Kawashima T, Uthoff HK. 1991. Pattern of bone loss of the proximal femur: A radiologic, densitometric, and histomorphometric study. *J Orthop Res* 9:634-640.
- Keith A. 1919. *Menders of the Maimed: The Anatomical and Physiological Principles Underlying the Treatment of Injuries to Muscles, Nerves, Bones, and Joints*. Philadelphia: J.B. Lippincott Company.
- Kerr R, Resnick D, Sartoris DJ, Kursunoglu S, Pineda C, Haghighi P, Greenway G, Guerra J, Jr. 1986. Computerized tomography of proximal femoral trabecular patterns. *J Orthop Res* 4:45-56.
- Keyak JH, Kaneko TS, Tehranzadeh J, Skinner HB. 2005. Predicting proximal femoral strength using structural engineering models. *Clin Orthop Relat Res*:219-228.
- Keyak JH, Meagher JM, Skinner HB, Mote CD, Jr. 1990. Automated three-dimensional finite element modelling of bone: a new method. *J Biomed Eng* 12:389-397.
- Kiel J, Kaiser K. 2022. Stress reaction and fractures.
- Knothe Tate ML. 2003. "Whither flows the fluid in bone?" An osteocyte's perspective. *J Biomech* 36:1409-1424.

- Kolaczko JG, McMellen CJ, Magister SJ, Wetzel RJ. 2021. Comparison of time to healing and major complications after surgical fixation of nondisplaced femoral neck stress fractures: A systematic review. *Injury* 52:647-652.
- Koval KJ, Zuckerman JD. 2002. *Handbook of fractures*, 2nd ed. Philadelphia: Lippincott Williams & Wilkins.
- Kummer B. 1993. Is the Pauwels' theory of hip biomechanics still valid? A critical analysis, based on modern methods. *Ann Anat* 175:203-210.
- Kyle R. 1994. Fractures of the proximal part of the femur. *Journal of bone and joint surgery* 76-A:924-951.
- Laroche M, Ludot I, Thiechart M, Arlet J, Pieraggi M, Chiron P, Moulinier L, Cantagrel A, Puget J, Utheza G, Mazieres B. 1995. Study of the interosseous vessels of the femoral head in patients with fractures of the femoral neck or osteoarthritis of the hip. *Osteoporosis International* 5:213-217.
- Laros GS. 1990. Intertrochanteric fractures. In: McCollister EC, editor. *Surgery of the musculoskeletal system*, 2nd ed. New York: Churchill Livingstone. p 2613-2639.
- Latta LL. 1991. 5. Part 1: Mechanics of normal and reconstructed limbs. *Current Orthopaedics* 5:33-41.
- Lau E, Lee WD, Li J, Xiao A, Davies JE, Wu Q, Wang L, You L. 2011. Effect of low-magnitude, high-frequency vibration on osteogenic differentiation of rat mesenchymal stromal cells. *J Orthop Res* 29:1075-1080.
- Lee T, Choi JB, Schafer BW, Segars WP, Eckstein F, Kuhn V, Beck TJ. 2009. Assessing the susceptibility to local buckling at the femoral neck cortex to age-related bone loss. *Ann Biomed Eng* 37:1910-1920.
- Lehman RA, Jr., Shah SA. 2004. Tension-sided femoral neck stress fracture in a skeletally immature patient. A case report. *J Bone Joint Surg Am* 86-A:1292-1295.
- Lim L-A, Carmichael SW, Cabanela ME. 1999. Biomechanics of total hip arthroplasty. *The Anat Rec* 257:110-116.
- Ling R, O'Connor J, Lu T-W, Lee A. 1996. Muscular activity and the biomechanics of the hip. *Hip International* 6:91-105.
- Lotz JC, Cheal EJ, Hayes WC. 1991a. Fracture prediction for the proximal femur using finite element models: Part I--Linear analysis. *J Biomech Eng* 113:353-360.
- Lotz JC, Cheal EJ, Hayes WC. 1991b. Fracture predictions for the proximal femur using finite element model: Part II-Nonlinear analysis. *J Biomech Eng* 113:361-365.
- Lotz JC, Cheal EJ, Hayes WC. 1995. Stress distributions within the proximal femur during gait and falls: Implications for osteoporotic fracture. *Osteoporosis Int* 5:252-261.
- Lotz JC, Gerhart TN, Hayes WC. 1990. Mechanical properties of trabecular bone from the proximal femur: a quantitative CT study. *J Comput Assist Tomogr* 14:107-114.
- Lovejoy CO. 1988. Evolution of human walking. *Sci Am* 259:118-125.
- Lovejoy CO. 2005. The natural history of human gait and posture. Part 2. Hip and thigh. *Gait Posture* 21:113-124.
- Loveridge N, Reeve J. 2004. Femoral neck fragility: genes or environment? *J Musculoskelet Neuronal Interact* 4:148-151.
- Maitra RS, Johnson DL. 1997. Stress fractures. Clinical history and physical examination. *Clin Sports Med* 16:259-274.
- Maquet PGJ. 1985. Biomechanics of the hip. In: *Biomechanics of the hip as applied to osteoarthritis and related conditions*. Berlin: Springer-Verlag. p 1-45.
- Martelli S. 2017. Femoral neck strain during maximal contraction of isolated hip-spanning muscle groups. *Computational and Mathematical Models in Medicine* Article ID 2873789:1-10.
- Martelli S, Beck B, Saxby D, Lloyd D, Pivonka P, Taylor M. 2020. Modelling human locomotion to inform exercise prescription for osteoporosis. *Curr Osteoporos Rep* 18:301-311.
- Martin RB, Atkinson PJ. 1977. Age and sex-related changes in the structure and strength of the human femoral shaft. *J Biomech* 10:223-231.

- Martini F. 1995. *Fundamental of anatomy and physiology*, 3rd ed. Upper Saddle River: Prentice Hall.
- Mautalen CA, Vega EM, Einhorn TA. 1996. Are the etiologies of cervical and trochanteric hip fractures different? *Bone* 18:133S-137S.
- Mayer P. 1978. Current concepts of the biomechanics of the hip.
- Mayhew PM, Thomas CD, Clement JG, Loveridge N, Beck TJ, Bonfield W, Burgoyne CJ, Reeve J. 2005. Relation between age, femoral neck cortical stability, and hip fracture risk. *Lancet* 366:129-135.
- McInnis KC, Ramey LN. 2016. High-risk stress fractures: Diagnosis and management. *PM R* 8:S113-124.
- Meyers MH. 1985. *Fractures of the Hip*, 1st ed: Year Book Medical Publishers.
- Miller MD. 1996. *Review of orthopaedics*, 2nd ed. Philadelphia: W.B. Saunders Company.
- Miller Z, Fuchs MB, Arcan M. 2002. Trabecular bone adaptation with an orthotropic material model. *J Biomech* 35:247-256.
- Mizrahi J, Margulies JY, Leichter I, Deutsch D. 1984. Fracture of the human femoral neck: Effect of density of the cancellous core. *J Biom Eng* 6:56-62.
- Monteleone GP, Jr. 1995. Stress fractures in the athlete. *Orthop Clin North Am* 26:423-432.
- Moore KL. 1985. *Clinically oriented anatomy*, 2nd ed. Baltimore: Williams & Wilkins.
- Morris JM. 1971. Biomechanical aspects of the hip joint. *Orthopedic Clinics of North America* 2:33-54.
- Mourtada FA, Beck TJ, Hauser DL, Ruff CB, Bao G. 1996. Curved beam model of the proximal femur for estimating stress using dual-energy X-ray absorptiometry derived structural geometry. *J Orthop Res* 14:483-492.
- Nawathe S, Nguyen BP, Barzanian N, Akhlaghpour H, Bouxsein ML, Keaveny TM. 2015. Cortical and trabecular load sharing in the human femoral neck. *J Biomech* 48:816-822.
- Neville AC. 1993. *Biology of fibrous composites. Development beyond the cell membrane*, 1 ed. New York: Cambridge University Press.
- Oh I, Harris WH. 1978. Proximal strain distribution in the loaded femur. An *in vitro* comparison of the distributions in the intact femur and after insertion of different hip-replacement femoral components. *J Bone Joint Surg Am* 60:75-85.
- Oliveira US, Labronici PJ, Joao Neto A, Nishimi AY, Pires RE, Silva LH. 2016. Bilateral stress fracture of femoral neck in non-athlete - case report. *Rev Bras Ortop* 51:735-738.
- Oxnard CE. 2004. Thoughts on bone biomechanics. *Folia Primatol (Basel)* 75:189-201.
- Parke. 1992. The anatomy of the hip joint. In: Balderstron RA, Booth RE, Hozack WJ, editors. *The hip*. London: Lea and Febiger. p 3-40.
- Patel KM, Handal BA, Payne WK. 2018. Early diagnosis of femoral neck stress fractures may decrease incidence of bilateral progression and surgical interventions: A case report and literature review. *Int J Surg Case Rep* 53:189-192.
- Pauwels F. 1976. *Biomechanics of the normal and diseased hip: Theoretical foundation, technique, and results of treatment*. Berlin: Springer-Verlag.
- Pellikaan P, Giarmatzis G, Vander Sloten J, Verschuere S, Jonkers I. 2018. Ranking of osteogenic potential of physical exercises in postmenopausal women based on femoral neck strains. *PLoS One* 13:e0195463.
- Petrin Z, Sinha A, Gupta S, Patel MK. 2016. Young man with sudden severe hip pain secondary to femoral neck stress fracture. *BMJ Case Rep* 2016.
- Pidaparti RMV, Turner CH. 1997. Cancellous bone architecture: Advantages of nonorthogonal trabecular alignment under multidirectional loading. *J Biomech* 30:979-983.
- Pihlajamaki HK, Ruohola JP, Kiuru MJ, Visuri TI. 2006. Displaced femoral neck fatigue fractures in military recruits. *J Bone Joint Surg Am* 88:1989-1997.
- Poss R. 1984. Functional adaptation of the human locomotor system to normal and abnormal loading patterns. *Calcif Tissue Int* 36 Suppl 1:S155-161.

- Power J, Loveridge N, Lyon A, Rushton N, Parker M, Reeve J. 2005. Osteoclastic cortical erosion as a determinant of subperiosteal osteoblastic bone formation in the femoral neck's response to BMU imbalance. Effects of stance-related loading and hip fracture. *Osteoporos Int* 16:1049-1056.
- Provencher MT, Baldwin AJ, Gorman JD, Gould MT, Shin AY. 2004. Atypical tensile-sided femoral neck stress fractures: the value of magnetic resonance imaging. *Am J Sports Med* 32:1528-1534.
- Qian J-G, Li Z, Zhang H, Bian R, Zhang S. 2014. Effectiveness of skeletal fitness exercises on stress of femoral neck using musculoskeletal dynamics simulations and finite element model. *J. Human Kinetics* 41:59-70.
- Rafferty KL. 1998. Structural design of the femoral neck in primates. *J of Hum Evol* 34:361-383.
- Reeve J, Loveridge N. 2014. The fragile elderly hip: mechanisms associated with age-related loss of strength and toughness. *Bone* 61:138-148.
- Resnick D, Niwayama G. 1988. *Diagnosis of bone and joint disorders*, 2nd ed. Philadelphia: WB Saunders Co.
- Resnik CS, Kerr R, Sartoris DJ, Resnick D. 1987. The architecture of the proximal femur: an imaging analysis. *Crit Rev Diagn Imaging* 27:49-89.
- Robertson GA, Wood AM. 2017. Femoral neck stress fractures in sport: a current concepts review. *Sports Med Int Open* 1:E58-E68.
- Rooney AM, Bostrom MPG, Dempster DW, Nieves JW, Zhou H, Cosman F. 2020. Loading modality and age influence teriparatide-induced bone formation in the human femoral neck. *Bone* 136:115373.
- Rooney AM, Dempster DW, Nieves JW, Zhou H, Bostrom MPG, Cosman F. 2022. Effects of teriparatide and loading modality on modeling-based and remodeling-based bone formation in the human femoral neck. *Bone* 157:116342.
- Rosenthal DI, Scott JA. 1983. Biomechanics important to interpret radiographs of the hip. *Skeletal Radiol* 9:185-188.
- Rossi JM, Wendling-Mansuy S. 2007. A topology optimization based model of bone adaptation. *Comput Methods Biomech Biomed Engin* 10:419-427.
- Rudman KE, Aspden RM, Meakin JR. 2006. Compression or tension? The stress distribution in the proximal femur. *Biomed Eng Online* 5:12.
- Ruff C. 2017. Mechanical constraints on the hominin pelvis and the "obstetrical dilemma". *Anat Rec (Hoboken)* 300:946-955.
- Ruff CB, Burgess ML, Ketcham RA, Kappelman J. 2016. Limb bone structural proportions and locomotor behavior in A.L. 288-1 ("Lucy"). *PLoS One* 11:e0166095.
- Ruff CB, Higgins R. 2013. Femoral neck structure and function in early hominins. *Am J Phys Anthropol* 150:512-525.
- Ryan TM, Krovitz GE. 2006. Trabecular bone ontogeny in the human proximal femur. *J Hum Evol* 51:591-602.
- Rybicki EF, Simonen FA, Weis EB, Jr. 1972. On the mathematical analysis of stress in the human femur. *J Biomech* 5:203-215.
- Rydell N. 1973. Biomechanics of the hip-joint. *Clin Orthop Relat Res*:6-15.
- Sanderlin BW, Raspa RF. 2003. Common stress fractures. *Am Fam Physician* 68:1527-1532.
- Schatzker J. 1984. Subtrochanteric fractures of the femur. In: *The Rationale of Operative Fracture Care*. p 217-234.
- Schatzker J. 1991. Screws and plates and their application.
- Schatzker J. 2005. Subcapital and intertrochanteric fractures. In: *The rationale of operative fracture care*: Springer. p 343-365.
- Schatzker J, Waddell JP. 1980. Subtrochanteric fractures of the femur. *Orthop Clin North Am* 11:539-554.
- Shaw KA, Moreland CM, Hunt TJ, Barkley C, O'Brien F, Jackson KL. 2022. Femoral neck stress fractures in athletes and the military. *J Bone Joint Surg Am* 104:473-482.

- Sheehan SE, Shyu JY, Weaver MJ, Sodickson AD, Khurana B. 2015. Proximal femoral fractures: what the orthopedic surgeon wants to know. *Radiographics* 35:1563-1584.
- Shin AY, Gillingham BL. 1997. Fatigue fractures of the femoral neck in athletes. *J Am Acad Orthop Surg* 5:293-302.
- Simpson SW, Levin NE, Quade J, Rogers MJ, Semaw S. 2019. *Ardipithecus ramidus* postcrania from the Gona Project area, Afar Regional State, Ethiopia. *J Hum Evol* 129:1-45.
- Singh M, Nagrath AR, Maini PS. 1970. Changes in trabecular pattern of the upper end of the femur as an index of osteoporosis. *J Bone Joint Surg Am* 52:457-467.
- Skedros JG. 2011. *Interpreting load history in limb-bone diaphyses: Important considerations and their biomechanical foundations*: CRC Press.
- Skedros JG, Hughes PE, Nelson K, Winet H. 1999. Collagen fiber orientation in the proximal femur: challenging Wolff's tension/compression interpretation. *J Bone Miner Res* 14:S441.
- Skerry TM. 2006. One mechanostat or many? Modifications of the site-specific response of bone to mechanical loading by nature and nurture. *J Musculoskelet Neuronal Interact* 6:122-127.
- Smyth EH. 1958. The mechanical problem of the artificial hip. *J Bone Joint Surg Br* 40-B:778-798.
- Steele CE, Cochran G, Renninger C, Deafenbaugh B, Kuhn KM. 2018. Femoral neck stress fractures: MRI risk factors for progression. *J Bone Joint Surg Am* 100:1496-1502.
- Stulberg BN, Bauer TW, Watson JT, Richmond B. 1989. Bone quality. Roentgenographic versus histologic assessment of hip bone structure. *Clin Orthop Relat Res*:200-205.
- Sverdlova NS, Witzel U. 2010. Principles of determination and verification of muscle forces in the human musculoskeletal system: Muscle forces to minimise bending stress. *J Biomech* 43:387-396.
- Tachdijan MO. 1990. Developmental coxa vara. In: *Pediatric orthopedics*. Philadelphia: WB Saunders Co. p 585.
- Tomar L, Govil G, Dhawan P. 2020. Bilateral femoral neck stress fracture in an obese middle-aged female with osteomalacia and coxa-vara managed by simultaneous bilateral total hip arthroplasty. *Cureus* 12:e11478.
- Valliappan S, Svensson NL, Wood RD. 1977. Three dimensional stress analysis of the human femur. *Comput Biol Med* 7:253-264.
- Van Audekercke R, Van der Perre G. 1994. The effect of osteoporosis on the mechanical properties of bone structures. *Clin Rheumatol Suppl*:38-44.
- Vander Sloten J, Van der Perre G. 1989. Trabecular structure compared to stress trajectories in the proximal femur and the calcaneus. *J Biomed Eng* 11:203-208.
- Venieratos D, Papadopoulos NJ, Anastassiou J, Katritsis ED. 1987. A quantitative estimation of the divergence between the trabecular system and the stress trajectories in the upper end of the human femoral bone. *Anat Anz* 163:301-310.
- von Meyer GH. 2011. The classic: The architecture of the trabecular bone (tenth contribution on the mechanics of the human skeletal framework). *Clin Orthop Relat Res* 469:3079-3084.
- Voo L, Armand M, Kleinberger M. 2004. Stress fracture risk analysis of the human femur based on computational biomechanics. *Johns Hopkins Apl Tech Dig* 25:223-230.
- Walkoff O. 1904. *Das femur des menschen und der athropomorphen seiner funktionellen gestaltung. Studien zur Entwicklungsgeschichte des Primatenskeletts* 1.
- Warden SJ, Carballido-Gamio J, Weatherholt AM, Keyak JH, Yan C, Kersh ME, Lang TF, Fuchs RK. 2020. Heterogeneous spatial and strength adaptation of the proximal femur to physical activity: A within-subject controlled cross-sectional study. *J Bone Miner Res* 35:681-690.
- Williams JF, Svensson NL. 1971. An experimental stress analysis of the neck of the femur. *Med Biol Eng* 9:479-493.
- Williams PL, Warnick R., Dyson M., Bannister L.H. 1989. Mechanical properties of bone. British edition of Gray's anatomy. 37th ed. 76:276-278.

Wolff J. 1892. Das gesetz der transformation der knochen. Berlin: Springer-Verlag.
Woolf AD, Dixon ASJ. 1988. Osteoporosis: a clinical guide: Taylor & Francis.