

Tesi doctoral presentada per En/Na

Rosendo ULLOT FONT

amb el títol

**"Alargamiento de fémur
con resección de periostio.
Estudio experimental en el conejo"**

per a l'obtenció del títol de Doctor/a en

MEDICINA I CIRURGIA

Barcelona, 14 de juliol de 1994.

Facultat de Medicina
Departament d'Obstetrícia i Ginecologia,
Pediatría, Radiologia i Medicina Física



UNIVERSITAT DE BARCELONA



VI BIBLIOGRAFIA

Abbott, LC: The operative lengthening of the tibia and fibula. *J Bone Jt Surg*, 9: 128, 1927.

Abbott, LC: Lengthening of the lower extremities. *California and Western Medicine*, 36: 6, 1932.

Abbott, LC, y Saunders, JB: The operative lengthening of the tibia and fibula. a preliminary report on the further development of the principles and technic. *Ann Surg*, 110: 961, 1939.

Abbott, LC, y Gill, GG: Surgical approaches to the epiphyseal cartilages of the knee and ankle joints. *Arch Surg*, 46: 591, 1943.

Abstracts of Ilizarov Techniques for the Treatment of Nonunions. Bone Defects, Osteomyelitis, Fractures, Adult Limb Length Discrepancy and Deformity. Baltimore. University of Maryland, 1988.

Aldegheri, R; De Bastiani, G, y Renzi Brivio, L: Allungamento diafisario dell'arto inferiore (studio di 78 casi). *Chir Organi Mov*, 70: 111, 1985.

Aldegheri, R; Renzi-Brivio, L, y Agostini, S: The callotasis method of limb lengthening. *Clin Orthop*, 241: 137, 1989.

Alho, A; Bang, G; Karaharju, E, y Armound, I: Filling of a bone defect during experimental osteotaxis distraction. *Acta Orthop Scand*, 53: 29, 1982.

Allan, FG: Bone lengthening. *J Bone Joint Surg*, 30B: 490, 1948.

Allioux, JJ; Rigault, P; Padovani, JP; Finidori, G; Touzet, Ph, y Mallet, JF: Allongement extemporané du fémur chez l'enfant et l'adolescent Etude de 25 cas. *Rev Chir Orthop*, 74: 252, 1988.

Alonso, JE, y Regazzoni, P: The use of the Ilizarov concept with the AO/ASIF tubular fixateur in the treatment of segmental defects. *Orthop Clin North Am*, 21: 655, 1990.

Anderson WV: Leg lengthening. *J Bone Joint Surg*, 34B: 150, 1952.

Andry N (Eds.): *Orthopaedia: or, the Art of Correcting and Preventing Deformities in Children*. London, A Millar, 1743.

Armour PC y Scott JHS: Equalisation of Leg Length. *J Bone Jt Surg*, 63B: 587, 1981.

Aronson, J; Good, B, Stewart, Ch; Harrison, B, y Harp J: Preliminary studies of mineralization during distraction osteogenesis. *Clin Orthop*, 250: 43, 1990.

Bartels, H: Sangre. En: Keidel, WD (Eds): *Fisiologia*. Barcelona: Salvat Editores, 23, 1971.

Basset. C, y Becker, R: Generation of electrical potentials by bone in response to mechanical stress. *Science*, 137: 1063, 1962.

Bayley, N: Individual patterns of development. *Child Develop*, 27: 45, 1956.

Beguiristain, JL; Gurrpide, C; Oriaifo, A, y Cañadell, J: Consideraciones sobre nuestra experiencia en elongación de fémur y tibia según el método de Wagner. *Rev Ortop Traum*, 23: 227, 1979.

Bensahel H, Huguenin Ph y Briard JL: L'allongement trans-épiphysaire du tibia. *Rev Chir Orthop*, 69: 245, 1983.

Berchiche, R, y Wittek, F: Allongement du squelette jambier par épiphywiolyse-distraction. Traitement des inégalités des membres inférieurs. *Acta Orthop Belg*, 49: 321, 1983.

Bianchi-Maiocchi, A; Benedetti, GB, y Catagni, MA: Introduzione alla conoscenze della metodiche di Ilizarov in ortopedia e traumatologia. Milano. *Medi Surgical Video*, 1983.

Bjerkreim I y Hellum C: Femur lengthening using the Wagner technique. *Acta Orthop Scand*, 54: 263, 1983.

Blair, VP; Schoenecker, PL; Sheridan, JJ, y Capelli, AM: Closed shortening of the femur. *J Bone Joint Surg* 71A: 1440, 1989.

Blane, CE; Herzenberg, JE, y Di Pietro, MA: Radiographic imaging for Ilizrov limb lengthening in children. *Pediatr Radiol*, 21: 117, 1991.

Bösch, P; Braun, F; Eschberger, J; Kovac, W, y Spängler, HP: Die beeinflussung der knochenheilung durch hochkonzentriertes fibrin. Experimentelle untersuchungen am kaninche. *Arch Orthop Unfall Chir*, 89: 259, 1977.

Bösch, P; Linter, F, y Braun, F: Die autologe spongiosatransplantation uner anwendung des fibrinklebesystems im tierexperiment. *Wien Klin Wodhenschr*, 91: 628, 1979.

Bösch, P; Linter, F; Arbes, H, y Brand, G: Experimental investigations of the effect of the fibrin adhesive on the kiel heterologous bone graft. *Arch Orthop Taum Surg*, 96: 177, 1980.

Bost, FC: Operative lengthening of the bones of the lower extremity. AAOS, Instructional Course Lectures, Ann Arbor, JW Edwards. 1: 50, 1944.

Bost FC y Larson LJ: Experiences with lengthening of the femur over an intramedullary rod. J Bone Jt Surg, 38A: 567, 1956.

Brands, W; Beck, M, y Raute-Kreinsen, J: Gewebeklebung der rupturierten Milz Mithochkonzentriertem Human- Firbrinoges. Z Kinderchir, 32: 341, 1981.

Burstein, DB; Fischer, DA, y Dahl, NT: Closed femoral shortening: results and complications in a series of 59 patiens. Congreso de la American Academy of Orthopaedic Surgeons. New Orleans, Febrero 1990, 509.

Cain, J; Dryer, RF, y Barton, BR: Evaluation of dural closure tecniques. Suture methods. Fibrin adhesive sealant and cyanoacrylate polymer. Spine, 13: 721, 1988.

Cañadell, J, y De Pablos, J: Breaking bony bridges by physseal distraction.

Pamplona: University Clinic of Navarra, 9: 223, 1985.

Cañadell, J: Sobre el aumento de versatilidad y ampliación de las posibilidades de un fijador externo monolateral en traumatología y ortopedia. Rev Ortop Traum, 30: 477, 1986.

Cañadell, J, y De Pablos, J: Methods of bone lengthening and their applications. Pamplona: University Clinic of Navarra, 3: 1988.

Cañadell, J; De Pablos, J, y Azcárate, JR: Modificación del aparato de Wagner para elongaciones de tipo fisario y metafisario. Rev Soc And Ortop Traum, 8: 139, 1988.

Cañadell, J y De Pablos, J: Los métodos de elongación ósea y sus aplicaciones. Rev Ortop Traum, 34: 327, 1990.

Carlioz H, Pichon F, Barthelemy A, Lebard JP, Filipe G: Allongement progressif selon la technique de H Wagner. Rev Chir Orthop, 66: 473, 1980.

Carrell W: Leg lengthening. *South Med J*, 22: 216, 1929.

Catagni MA, Bolano L y Cattaneo R: Management of Fibular Hemimelia Using the Ilizarov Method. *Orthop Clin North Am*, 22: 715, 1991.

Cattaneo, R; Villa, A; Catagni, MA, y Bell, D: Lengthening of the humerus using the Ilizarov Technique. *General Hospital of Lecco*, 250; 117, 1989.

Caton J, Michel CR, Berart J: L'allongement progressif des membres selon la méthode de H. Wagner. Problèmes techniques et indications. *Lyon Chir*, 80: 272, 1984.

Caton J, Dumont P, Berard J y Michel CR: Étude des résultats à moyen terme d'une série de 33 allongements des membres inférieurs selon la technique de H. Wagner. *Rev Chir Orthop*, 71: 44, 1985.

Cauchoix J, Rey JC, Herifret G, Cotrel Y y Morel G: L'allongement du fémur dans le traitement des inégalités de longueur des membres inférieurs.

Description d'une technique d'allongement extemporané. *Rev Chir Orthop*, 49: 193, 1963.

Cauchoix J, Morel G, Rey JC, Cotrel Y y Ghosez JP: L'allongement extemporané du fémur. *Rev Chir Orthop*, 58: 753, 1972.

Chandler D, King JD, Bernstein SM, Marrero G, Kih J y Hambrecht H: Results of 21 Wagner Limb Lengthening in 20 Patients. *Clin Orthop*, 230: 214, 1988.

Chao, EY-U: Fissazione esterna e guarigione delle fratture: proprietà biomeccaniche di strumenti diversi. En: Ricciardi, L. (Eds): *Attualità in traumatologia: metodiche a confronto*. Bologna: Aulo Gaggi Editore, 191, 1985.

Claes, L; Burri, C; Gerngross, H, y Mutschler, W: Bone healing stimulated by plasma factor XIII. Osteotomy experiments in sheep. *Acta Orthop Scand*, 56: 57, 1985.

Codivilla, A: On the means of lengthening in the lower limbs, the muscles and the tissues which are shortened through defpr,otu. *Am J Orthop Surg*, 2: 353, 1905.

Coleman, SS, y Nooman, TD: Anderson's method of tibial lengthening by percutaneous osteotomy and gradual distraction. Experience with 31 cases. *J Bone Joint Surg*, 49A: 263, 1967.

Coleman, SS, y Stevens, PM: Tibial lengthening. *Clin Orthop*, 136: 92, 1978.

Coleman, SS, y Scott, SM: The present attitude toward the biology and technology of limb lengthening. *Clin Orthop*, 264: 76, 1991.

Compere, EL: Indications for and against the leg-lengthening operation. Use of the tibial bone graft as a factor in preventing delayed union, non-union or late fracture. *J Bone Joint Surg*, 18: 692, 1936.

Connolly, JF; Hurman, W, y Ray, S: Physeal distraction treatment of fractura deformities. *Orthop Trans*, 3: 231, 1979.

Connolly, JF; Huurman, W, y Pankaj, R: Long term effect of physel distraction. *Ortoh Trans*, 6: 267, 1982.

Connolly JF, Huurman WW, Lippiello L y Pankaj, R: Epiphyseal Traction to Correct Acquired Growth Deformities. *Clin Ortop*, 202: 258, 1986.

Correll J: Surgical Correction of Short Stature in Skeletal Dysplasias. *Acta Paediatr Scand (Suppl)* 377: 143, 1991.

Dahl, MT, y Fisher, DA: Lower Extremity Lengthening by Wagner's Method and by Callus Distraction. *Orthop Clin North Am*, 22: 643, 1991.

Dal Monte, A, y Donzelli, O: Tibial Lengthening According to Ilizarov in Congenital Hypoplasia of the Leg. *J Pediatr Orthop*, 7: 135, 1987.

De Bastiani, G; Aldegheri, R, y Renzi-Brivio, L: Fissatore esterno assiale. *Chir Organi Mov*, 65: 287, 1979.

De Bastiani, G; Aldegheri, R; Renzi-Brivio, L, y Trivilla, G: Limb lengthening by distraction of the epiphyseal plate. A comparison of two techniques in the rabbit. *J Bone Joint Surg*, 68B: 545, 1986.

De Bastiani, G; Aldegheri, R; Renzi-Brivio, L, y Trivella, G: Chondrodiatasis-Controlled symmetrical distraction of the epiphysal plate. Limb lengthening in children. *J Bone Joint Surg*, 68B: 550, 1986.

De Bastiani, G; Aldegheri, R; Renzi-Brivio, L, y Trivella, G: Limb lengthening by callous distraction (callotasis). *J Pediatr Orthop*, 7: 129, 1987.

Delageniere, H: Traitement chirurgical des blessures des nerfs. *Bull et mém Soc de chir de Paris*, 44: 524, 1918.

De Pablos, J: Elongación ósea mediante distracción fisaria. Estudio experimental. Tesis Doctoral. Universidad de Navarra. Pamplona, 1984.

De Pablos, J; Villas, C, y Cañadell, J: Bone lengthening by physial distraction. An experimental study. Department of Orthopaedic Surgery, University of Navarra, Pamplona, Spain, 10: 163, 1986.

De Pablos, J; Cañadell, J; MacEwen, GD, y Bowen, JR: Bone lengthening methods in the treatment of large segmental bone defects. En: Aebi M, Regazzioni, P. (Eds) In Bone transplantation. Springer-Verlag, Berlin-Heidelberg, 346, 1989.

Dickson, FD, y Diveley, RL: A new apparatus for lengthening of legs. J Bone Joint Surg, 14: 194, 1932.

Domínguez, JJ: Proceso reparador de una fractura. Rev Ortop Traum, 29: 523, 1985.

Duhamel, HL: Sur une racine qui a la faculté de tiendre en rouge les os des animaux vivants. Mem Acad Roy, des Sciencies. Paris, 52: 1, 1739.

Duhamel, HL: Sur le developpement et la crête des os des animaux. Mem Acad Roy des Sciences. Paris, 55: 354, 1742.

Duhamel, HL: Quatrième mémoire sur les os dans lequel on se propose de rapporter de nouvelles preuves qui établissent que les os croissent en grosseur par l'addition de couches osseuses qui tirent leur origine du perioste. Communication à l'Acad Roy des Sciences. Paris, 56: 87, 1743.

Dumont P: L'allongement progressif du fémur et du tibia selon la technique de Wagner dans les membres inférieurs. Thèse médecine. Université de Lyon, 1983.

Duriez, J: L'ostéotomie en Z pour allongement extemporané du fémur. Particularités de la réparation osseuse. Rev Chir Orthop, 58: 775, 1972

Duspiva, W: Neue Erkenntnisse zur anastomosierung druchtrennter peripherer nerven. Foster Med, 93: 2214, 1978.

Egloff, DV, y Narakas, A: Anastomoses nerveuses par fibrino-collage. *Ann Chir Main*, 2: 101, 1983.

Eldridge, JC, y Bell, DF: Problems with substantial limb lengthening. *Orthop Clin North Am*, 22: 625, 1991.

Elmer, EB; Ehrlich, MG; Zaleske, DJ; Polsky, Ch, y Mankin, HJ: Chondrodiatasis in rabbits: A study of the effect of transphyseal bone lengthening on cell division, synthetic functrion, and microcirculation in the growth plate. *J Pediatr Orthop*, 12: 181, 1992.

Ensley, NJ; Gren, NE, y Barnes, WP: Femoral lengthening with the Barnes device. *J Pediatr Orthop*, 13: 57, 1993.

Escriba, A, y Maluenda, MP: Fisiología de la hemostasia. En *Tratado de Medicina práctica Medicine*. 3.^a serie IDEPSA. Madrid, 715, 1981.

Eydelshtein, BM; Udalova, NF, y Bochkarev, GF: Dynamics of reparative regeneration after lengthening by the method of distraction epiphysiolyis. *Acta Chir Plast*, 15: 149, 1973.

Fischenko, PJ; Sadovefa, VI; Karimova, LF, y Pilipenko, NP: Roentgenographic imaging of the regenerate formation in distraction epiphysiolyis. *Ortop Traumatol Protez*, 37: 29, 1976.

Fishbane, BM, y Riley, LH: Continuous trans-physeal traction. A simple method of bone lengthening. *Johns Hopkins Med J*, 138: 79, 1976.

Fishbane, BM, y Riley, LH: Continuous transphyseal traction: Experimental observation. *Clin Orthop Rel Res*, 136: 120, 1978.

Fishbane, BM, y Rilke, LH: Continuous transphyseal traction: experimental observations. *Clin Orthop*, 136: 120, 1980.

Franke, J; Hein, G; Simon, M, y Hauch ST: Comparison of distraction epiphyseolysis and partial metaphyseal corticotomy in leg lengthening. *Int Orthop (SICOT)*, 14: 405, 1990.

Freiberg, AH: Codivilla's method of lengthening the lower extremity. *Surg Gynec Obstet*, 14: 614, 1912.

Gallie, WE, y Robertson, DE: The repair of bone. *British J Surg*, 7: 211, 1919.

Grayhack, JJ, y Carroll, NC: Projected Limb Length Inequality: Selecting Patients for Surgery. *Orthop Clin North Am*, 22: 581, 1991.

Grill, F, y Franke, J: The Ilizarov distractor for the correction of relapsed or neglected clubfoot. *J Bone Joint Surg*, 69A: 593, 1987.

Grill, F, y Dungl, P: Lengthening for congenital short femur. *J Bone Joint Surg*, 73B: 439, 1991.

Green, SA: Complications of external fixators. *Clin Orthop*, 180: 109, 1983.

Green, SA: Complications of pin and wire fixation. En Green WB (Eds): Instructional Course Lectures, vol 39. Park Ridge, American Academy of Orthopaedics, 1990.

Green, SA: The use of wires and pint. Techniques in orthopaedics, 5: 19, 1990.

Green, SA: Postoperative management during limb lengthening. Orthop Clin North Am, 22: 723, 1991.

Green, SA: The Ilizarov method: Rancho technique. Orthop Clin North Am, 22: 677, 1991.

Gross, RH: An evaluation of tibial lengthening procedures. J Bone Joint Surg, 53A: 693, 1971.

Guidera, KJ; Hess, WF; Highhouse, KP, y Ogden, JA: Extremity lengthening: Results and complications with the Orthofix system. *J Pediatr Orthop*, 11: 90, 1991.

Haboush, E, y Finkelstein, H: Leg lengthening with new stabilizing apparatus. *J Bone Joint Surg*, 14: 807, 1932.

Hähnel, H: Die distraktionsepiphyseolyse erste erfahrungen bei der operativen bemverlängerung nach Ilisarov. *Beitr Orthop Traumatol*, 24: 594, 1977.

Ham, AW: A histological study of the early phase of bone repair. *Joint Bone Surg*, 12: 825, 1930.

Hardy, JM: The sequoia fixator. En: Coombs, R; Green, S, y Sarmiento, A (Eds). *External fixation and functional bracing*. Aspen: Frederick, MD, 395, 1989.

Hardy, JM; Tadlaoui, A; Wirotius, JM, y Saleh, M: The Sequoia circular fixator for limb lengthening. *Orthop Clin North Am*, 22: 663, 1991.

Herring JA y Bornhill B: Syme amputation. *J. Bone Joint Surg*, 68A: 573, 1986.

Höllerl, G; Höfler, H, y Stenzl, W: Ergebnisse nach experimenteller Versorgung von Milzverletzungen mit Fibrinkleber. En: Anwendung des Fibrinklebers in operativen Fächern. *Proceedings. Immuno Symposium*, 25, 1981.

Hood RW, Riseborough J: Lengthening of the lower extremities by the Wagner method. *J. Bone Joint Surg*, 63A: 1122, 1981.

Houghton, GR, y Duriez, J: Allongement tibial par élongation du cartilage de croissance tibial supérieur. Etude expérimentale chez le lapin. *Rev Chir Orthop*, 66: 351, 1980.

Hrutkay, JM, y Eilert, RE: Operative lengthening of the lower extremity and associated psychological aspects: The children's Hospital experience. *J Pediatr Orthop*, 10: 373, 1990.

Huppertz, R; Pfeil, K, y Kaps, JP: Sonographische verlaufskontrollen von verlängerungsosteotomien. *Z Orthop*, 128: 90, 1990.

Hutton PAN, Aichroth PM y Jones CB: Allongement du membre inférieur. Expérience et complications de la méthode de Wagner. *Rev Chir Orthop*, 69: 667, 1983.

Ilizarov, GA: A method of uniting bones in fractures and apparatus to implement this method. USSR Authorship Certificate 98471, field 1952.

Ilizarov, GA: A new principle of osteosynthesis with the use of crossing pins and rings. En: *Collected Scientific Works of the Kurgan Regional Scientific Medical Society*. Kurgan, USSR, 145, 1954.

Ilizarov, GA, y Ledioev, VI: Replacement of defects of long tubular bones by means of one of their fragments. *Vestn Khir*, 102: 77, 1969.

Ilizarov, GA, y Soybelman, CM: Some clinical and experimental data concernint bloodless lengthening of lower extremities. *Eksp Khir Anesthezil*, 4: 27, 1969.

Ilizarov, GA; Ledioev VI, y Shitin VP: The course of compact bone reparative regeneration in distraction osteosynthesis under different conditions of bone fragment fixation and experimental study (Russian). *Exp Khir Anesteziol*, 14(6): 3, 1969.

Ilizarov, GA, y Soybelman, LM: Some clinical and experimental data on the bloodless lengthening of lower limbs. *Exp Khir Anest*, 4: 27, 1969.

Ilizarov, GA; Soybelman, LM, y Chirkova, AM: Some roentgenologic and morphological data on regeneration of bone tissue in experimental distraction epiphysiolysis. *Ortop Traumatol Protez*, 31: 26, 1970.

Ilizarov, GA: Basic principles of transosseous compression and distraction osteosynthesis. *Ortop Travmatol Protez*, 11: 7, 1971.

Ilizarov, GA; Devyatov, AA, y Trokhova, VG: Surgical lengthening of the shortened lower extremities. *Vestn Khir*, 107: 100, 1972.

Ilizarov, GA; Gracheva, VI, y Kamerin, VK: Bloodless lengthening of lower leg by the the method of distraction epiphyseolysis. Methodologic recommendations of ministry of health of the RSFSR. Kurgan 1976.

Ilizarov, GA: Comunicación personal. XXII Convención del Club Italiano AO. Bellagio, Italia, 1981.

Ilizarov, GA: Comunicación personal. I Curso de la ASAMI. Lecco, Italia, 1983.

Ilizarov, GA: Some theoretical and clinical aspects of transosseous osteosynthesis. En: Abstracts of Second International Symposium on

Experimental, Theoretical and Clinical Aspects of Transosseous Osteosynthesis. Kurgan. USSR, 1986.

Ilizarov, GA: The tension-stress effect on the genesis and growth of tissues. Part I. The influence of stability of fixation and soft-tissues preservation. Clin Orthop, 238: 249, 1989.

Ilizarov, GA: The tension-stress effect on the genesis and growth of tissues. Part II. The influence of the rate and frequency of distraction. Clin Orthop, 239: 263, 1989.

Ilizarov, GA: Clinical applications of tension-stress effect for limb lengthening. Clin Orthop, 250: 8, 1990.

Jani L: Tierexperimentelle Studie über Tibiaverlängerung durch Distractionsepiphyseolyse. Z Orthop, 111: 627, 1973.

Jani, L: Die Distractionsepiphyseolyse. Tier experimentelle Studie zum Problem der Beinverlängerung. Z Orthop, 113: 189, 1975.

Johnson JTH y Southwick, WO: Growth following transepiphyseal bone grafts. An experimental study to explain continued growth following certain fusion operations. *J Bone Joint Surg*, 42A: 1381, 1960.

Jones DC, Moseley CF: Subluxation of the knee as a complication of femoral lengthening by the Wagner Technique. *J Bone Joint Surg*, 67A: 33, 1985.

Jones, CB; Dewar, ME; Aichroth, PM; Crawford, EJP, y Emery, R: Epiphyseal Distraction Monitored by Strain Gauges. *J Bone Joint Surg*, 71: 651, 1989.

Judet, J; Judet R; Rigault, P, y Plumerault, J: Traitement des inégalités des membres inférieurs par allongements du tibia. *Mem Acad Chir Paris*, 95: 532, 1969.

Judet, R, y coll: Les allongements de membre par distracteur. Premiers résultats. *Act Chir Orthop. Raymond Poincaré*, 12: 93, 1975.

Kawamura, B: Leg lengthening. *Seikeigeka*, 17: 872, 1966.

Kawamura, B; Mosono, S; Takahashi, T; Yano, T; Kobayashi, Y; Shibata, N, y Shinoda, Y: Limb lengthening by means of subcutaneous osteotomy: Experimental and clinical studies. *J Bone Joint Surg*, 50A: 851, 1968.

Kawamura, B: Limb lengthening. *Orthop Clin North Am*, 9: 155, 1978.

Kershaw, CJ, y Kenwright, J: Epiphyseal distraction for bony bridges: A biomechanical and morphologic study. *J Pediatr Orthop*, 13: 46, 1993.

Kletter, G; Matras, H, y Dinges, HP: Zur partiellen klebung von mikrogefasanastomosen im intrakraniellen bereich. *Wien Klin Wochenschr*, 90: 415, 1978.

Kojimoto, H; Yasui, N; Goto, T; Matsuda, S, y Shimomura, Y: Bone lengthening in rabbits by callus distraction. The role of periosteum and endosteum. *J Bone Joint Surg*, 70B: 543, 1988.

Kuderna, H, y Matras, H: Die klinische anwendung der klebung von nervenanastomosen bei der rekonstruktion verletzter peripherer nerven. Wien Klin Wochenschr, 87: 495, 1975.

Kunitz, M, y Northrop, JH: Isolation from beef pancreas of crystalline trypsinogen, trypsin a trypsin inhibitor and an inhibitor trypsin compount, J Gen Physiol, 19: 991, 1936.

Kusalic, M; Fortin, C, y Gauthier, Y: Psychodynamic aspects of dwarfism: Response to growth hormone treatment. Canadian Psychiatric Association Journal, 17: 29, 1972.

Laasonen, EM; Kyro, A; Jorhola, O, y Böstman, O: Magnetic resonance imaging of tibial shaft fracture repair. Arch Orthop Traumatol Surg, 108: 40, 1989.

Laki, K, y Lorand, I: On the solubility of fibrin clots. Science, 108: 280, 1948.

Lamoureaux, J, y Verstreken, L: Progressive Upper Limb Lengthening in Children: A Report of Two Cases. *J Pediatr Orthop*, 6: 481, 1986.

Langenskiöld, A: The possibilities of eliminating prematura partial closure of an epiphyseal plate caused by trauma or disease. *Acta Orthop Scand*, 38: 267, 1967.

Langenskiöld, A: An operation for partial closure of an epiphyseal plate in children and its experimental basis. *J Bone Joint Surg*, 57B: 325, 1975.

Langenskiöld, A: Surgical treatment of partial closure of the growth plate. *J Pediatr Orthop*, 1: 3, 1981.

Lascombe, P; Membre, H; Prévot, J, y Barrat E: Histomorphométrie du régénérat osseux dans les allongements des membres selon la technique d'Ilizarov. *Rev Chir Orthop*, 77: 141, 1991.

Lavini, F; Renzi-BrivioL, y De Bastiani, G: Psychologic, vascular, and physiologic aspects of lower limb lengthening in achondroplastics. *Orthop Clin North Am*, 250: 138, 1990.

Le Coeur, P: Egalisation des membres inférieurs par ostéotomie d'allongement et fixation immédiate. *Rev Chir Orthop*, 48: 500, 1962.

Le Coeur, P: Egalisation des membres inférieurs par allongement avec fixation immédiate. *Rev Chir orthop*, 49: 216, 1963.

Lehman, WB; Grant, AD, y Atar, D: Preventing and overcoming equinus contractures during lengthening of the tibia. *Orthop Clin North Am*, 22. 633, 1991.

Luke, DL; Schoenecker, PL; Blair, VP, y Capelli, AM: Fractures After Wagner Limb Lengthening. *J Pediatr Orthop*, 12: 20, 1992.

McKibbin, B: The biology of fracture healing in long bones. *J Bone Joint Surg*, 60B: 150, 1978.

Mac Ewen, W: The growth of bone observations on osteogenesis. The experimental inquiry into the development and reproduction of diaphyseal bone. (Eds) Jame Maclehose and sons. Glasgow, 1912.

Mac Ewen, W. (Citado por McKibbin): J Bone Joint Surg, 60B: 150, 1978.

Maffulli, N; Hughes, T, y Fixsen, JA: Ultrasonographic monitoring of limb lengthening. J Bone Joint Surg, 74B: 130, 1992.

Magnuson, P: Lengthening shortened bones of the leg by operation. Univ Penn Med Bull, 21: 103, 1908.

Magnuson, P: Lengthening of shortened bones of the leg by operation. Ivory screws with removable heads as a means of holding the two bone fragments. Surg Gynecol Obstet, 16: 63, 1913.

Manning, C: Leg lengthening. Clin Orthop, 136: 105, 1978.

Matras, H: Die wirkungen verschiedener fibrin preparate auf kontinuierstrennung der rattenhaut. Ost Z Stomat, 67: 338, 1970.

Matras, H; Dinges, HP; Lassmann, H, y Mamoli B: Zur nahtlosen interfazikuaren nerventransplantation im tierexperiment. Wien Med Wschr, 122: 517, 1972.

Matras, H; Dinges, HP; Mamoli, B, y Lassmann, H: Non-sutured nerve transplantation (a report on animal experiments). J Max-Fac Surg, 1: 37, 1973.

Matras, H; Braun, F; Lassmann, H; Ammerer, HP, y Mamoli, B: Plasma clot welding of nerves (experimental report). J Max-Fac Surg, 1: 236, 1973.

Matras, H; Mamoli, B, y Lassmann, H: Zur klebung von Nervenastomosen mit gerinungsubstanzen. Fortschr Kiefer Gesichtschirurgie, 20: 112, 1975.

Matras, H, y Kuderna, H: Glueing nerve anastomoses with clotting substances. Transactions of the Sixth International Congress of Plastic and Reconstructive Surgery. Masson. Paris, 134, 1976.

Matras, H; Chiari, F, y Fletter, G: Zur klebung von mikogefasanastomosen. Proceedings, 13th. Annual meeting, Dtsch Ges F Plast und Wiederherstellungschirurgie. Stuttgart Thieme 357S, 1977.

Matras, H; Jesch, W; Kletter, G, y Dinges, HP: Spinale duraklegung mit fibrinkleber. Eine experimentelle studie. Wien Klin Wschr, 90: 419, 1978.

Matras, H: Fibrin seal: the state of the art. J Oral Maxillofac Surg, 43: 605, 1985.

Mazet R: Symes amputation. J Bone Surg, 50A: 1549, 1968.

McCarroll, HR: Trials and tribulations in attempted femoral lengthening. J Bone Joint Surg, 32A: 132, 1950.

Merle D'Aubigné, R, y Dubousset, J: Surgical correction of large length discrepancies in the lower extremities of children and adults. *J Bone Joing Surg*, 53A: 411, 1971.

Monticelli, G, y Spinelli, R: Allongement des membres par distraction épiphysaire. *Rev Chir Orthop*, 67: 215, 1981.

Monticelli, G, y Spinelli, R: Lim lengthening by epiphyseal distraction. In *Orthop (SICOT)*, 5: 85, 1981.

Monticelli, G, y Spinelli, R: Distraction epiphysiolysis as a method of limg lengthening. I. Experimental study. *Clin Orthop*, 154: 284, 1981.

Monticelli, G, y Spinelli, R: Allungamento deli arti mediante corticotomia a cielo chiuso. *It J Ortop Traum*, 9: 139, 1983.

Moore, BH: A critical appraisal of the leg-lengthening operation. *Am J Surg*, 52, 415, 1941.

Morawitz, P: Die chemie der blutgerinnung. *Erg Physiol*, 307, 1905.

Morel G, Servant J, Valle A, Jegou D y Teillet J: L'allongement fémoral extemporané suivant la technique de Cauchoix chez l'enfant et l'adolescent. *Rev Chir Orthop*, 69: 195, 1983.

Morel G y Morin C: Technique simplifiée de l'allongement extemporané du fémur chez l'enfant. *Chir Pediatr*, 27: 91, 1986.

Morrison, FS: Complicaciones hemorrágicas en cirugía. En: *Complicaciones en cirugía y su tratamiento*. (Eds) Artz y Harcy, 59, 1978.

Mosca V y Moseley CF: Complications of Wagner leg lengthening and their avoidance. *Orthop Trans*, 10: 462, 1986.

Moseley, C, y Mosca, V: Results of limb lengthening using the Wagner device. *Orthop Trans*, 11: 52, 1987.

Moseley, CF: Leg lengthening: The historical perspective. *Orthop Clin North Am*, 22: 555, 1991.

Mulliken, JB; Kban, LB, y Glowachi, J: Induced osteogenesis the biological principle and clinical applications. *J Surg Res*, 37: 487, 1984.

Nakamura, K; Matsushita, T; Okazaki, H; Nagano, A, y Kurokawa, T: Attempted limb lengthening by physal distraction: Continuous monitoring of an applied force in immatura rabbits. *Clin Orthop*, 267: 306, 1991.

Ogden, JA: *Skeletal injury in the child*. Filadelfia: Saunders Company, 190, 1990.

Olerud, S, y Dankwardt-Lilliestrom, G: Fracture healing in compression osteosynthesis in the dog. *J Bone Joint Surg*, 50B: 844, 1968.

Olerud, S; Henriksson, TG, y Engkvist, O: A free vascularized fibular graft in lengthening of the humerus with the Wagnet apparatus. Report of a case in a twenty-year-old man. *J Bone Joint Surg* 65A: 111, 1983.

Ombredanne, L: Allongement d'un femur sur un membre trop courte. Bull Mem Soc Chirur (Paris), 39: 1177, 1913.

Osborn, JF, y Donath, K: Fibrinklebesystem und reparative osteogenese. Erste ergebnisse tierexperimenteller untersuchungen. Dtsch Zahnärztl. Z 38: 499, 1983.

Palazzi S: The use of fibrin sealant in nerve adhesions. En: G Schalg, H, Redl, (Eds): Fibrin sealant in operative medicine. Ophthalmology-Neurosurgery. Berlin-Heidelberg: Springer-Verlag, 2: 186, 1986.

Paley, D: Current techniques of limg lengthening. J. Pediatr Orthop, 8: 73, 1988.

Paley, D: Problems, obstacles and complications of limb lengthening by the Ilizarov technique. Clin Orthop, 250: 81, 1990.

Patterson, JM; Walter, CS, y Catterall, A: Lower limb lengthening by a modified Wagner technique. J Pediatr Orthop, 9: 129, 1989.

Peltier, LF: The operative lengthening of the femur. Vittorio Putti. Clin Orthop, 250: 4, 1990.

Peltonen, J; Alitalo, I; Karaharju, E, y Helio, H: Distraction of the growth plate. Experiments in pigs and sheep. Acta Orthop Scand, 55: 359, 1984.

Peltonen, JL; Karaharju, EO, y Alitalo, I: Experimental epiphysial distraction producint and correcting angular deformities. J Bone Joint Surg, 66B: 598, 1984.

Peltonen, J; Karaharju, E; Aalto, K; Alitalo, I, y Hietaniemi, K: Leg lengthening by osteotomy and gradual distraction: An experimental study. J Pediatr Orthop, 8: 509, 1988.

Peretti, G; Memeo, A; Formentoni, A; Di Lelio, A, y Marinoni, EC: Gli allungamenti degli arti inferiori. Chir Org Mov, 73: 53, 1987.

Peretti, G; Memeo, A; Formentoni, A; Di Lelio, A, y Marinoni, EC: Methods for the study of bone regeneration in lengthening of the limbs. *Int J Orthop Traumatol*, 15: 217, 1988.

Pesch, HJ, y Wagner, H: Histomorphologische Befunde der Knochenregeneration unter Distraction bei der diaphysären Verlängerungsosteotomie. *Verh Dtsch Ges Pathol*, 58: 305, 1974.

Pesi, G; Cha-Cha, M, y coll. Experience with tibial lengthening in Singapore. *Clin Orthop*, 6: 100, 1977.

Peterson, JMH; Waller, CS, y Catterall, A: Lower limb lengthening by a modified Wagner Technique. *J Pediatr Orthop*, 9: 129, 1989.

Pflüger, H; Bösch, P; Grundschober, F; Krinsten, H; Plenk, H, y Schider, S: Untersuchungen über das Einwachsen von Knochengewebe in poröse Metallimplantate. *Wien Klin Wochenschr*, 91: 482, 1979.

Phemister, D: Operative arrestment of longitudinal growth of bones in the treatment of deformities. *J Bone Joint Surg*, 15: 1, 1933.

Pouchelle, MC (Eds): *Corps et chirurgie a l'apogée du Moyen-Age*. Flammarion, Paris, 1983.

Pouliquen, JC; Beneux, J; Judet, R, y Cogan, D: L'allongement du tibia chez l'enfant. Étude des résultats et complications. *Rev Chir Orthop*, 64, 126, 1978.

Pouliquen, JC; Beneux, J; Verneret, C; Hardy, J, y Mener G: Allongement de tibia selon la méthode de Judet. A propos de 108 cas chez l'enfant. *Rev Chir Orthop*, 70: 29, 1984.

Price, CT: Limb lengthening for achondroplasia. *J Pediatr Orthop*, 9: 512, 1989.

Price, CT, y Mann JW: Experience with the orthofix device for limb lengthening. *Orthop Clin North Am*, 22: 651, 1991.

Pritchard, JJ: Bone healing. *Science. Basis Med Ann Rew*, 286, 1963.

Puhl, W; Böhm, B; Schimpf, K, y Braun, A: Fibrin zur blutstillung am spongiösen knochen beim hämophilie. En: Cotta, H, y Braun, A (Eds): *Fibrinkleber in orthopädie und traumatologic*. Stuttgart. Thieme-Verlag, 88, 1982.

Putti, V: The operative lengthening of the femur. *JAMA*, 77: 934, 1921.

Putti, V: Operative lengthening of the femur. *Surg Gynecol Obstet*, 58: 318, 1934.

Rális, ZA, y Rális, HM: A simple method for demonstration of osteoid in paraffin sections. *Med Lab Technol*, 32: 203, 1975.

Rális, HM, y Rális, ZA: Poorly mineralized osteoid bone and its staining in paraffin sections. *Med Lab Sci*, 35: 293. 1978.

Ray, SK; Connolly, JF, y Huerman, W: Distraction treatment of deformities due to physeal fractures. *Surgical Forum*, 21: 543, 1980.

Rhineland, FW; Phillips, RS; Steel, WM, y Beer, JC: Microangiography in bone healing, Part II: Displaced closed fractures. *J Bone Joint Surg*, 50A: 643, 1968.

Ricciardi, L: Epifisiolisi distrazionale monocompartimentale. *It J Orthop Traum*, 16: 57, 1984.

Ricciardi, L; Perissinotto, A, y Visentin, E: Ultrasonography in the evaluation of osteogenesis in fractures treated with Hoffman external fixation. *It J Orthop Traum*, 12: 185, 1986.

Rigault, P; Boucquey, P; Padovani, JP; Raux, Ph, y Finidori, G: L'allongement progressif du fémur chez l'enfant. A propos de 36 cas. *Rev Chir Orthop*, 66: 13, 1980.

Rigault, P; Dolz, G; Padovani, JP; Touzet, P, y Mallet JF: L'allongement progressif du tibia à propos de 48 cas. *Rev Chir Orthop*, 67: 461, 1981.

Ring, PA: Experimental bone lengthening by epiphysial distraction. *Br J Surg*, 49: 169, 1958.

Saleh, M, y Burton, M: Leg lengthening: Patient selection and management in achondroplasia. *Orthop Clin North Am*, 22: 589, 1991.

Sarmiento, A. Functional bracing of tibial fractures. *Clin Orthop*, 105: 202, 1974.

Sasso, RC; Urquhart, BA, y Cain, TE: Closed femoral shortening. *J Pediatr Orthop*, 13: 51, 1993.

Schlag, G, y Redl, H: Fibrin sealant in orthopedic surgery. *Clin Orthop*, 277: 269, 1988.

Schlenzka, D; Poussa, M, y Osterman, K: Metaphyseal distraction for lower limb lengthening and correction of axial deformities. *J Pediatr Orthop*, 10: 202, 1990.

Schopler, SA, Lawrence, JF, y Johnson, MK: Lengthening of the humerus for upper extremity limb length discrepancy. *J Pediatr Orthop*, 6: 477, 1986.

Schumacher, G; Braun, A, y Heine, WD: Das alloimplantat am knochen unter verwendung des fibrinklebesystems tierexperimentelle ergebnisse. En: Cotta, H, y Brau, A (Eds): *Fibrinkleber in orthopädie und traumatologic*. Stuttgart. Thieme-Verlag, 71, 1982.

Schwartzman, V; Choi, SH, y Schwartzman, R: Tibial nonunions. Treatment tactics with the Ilizarov method. *Orthop Clin North Am*, 21: 639, 1990.

Seddon, HJ, y Medawar, PB: Fibrin suture of human nerves. *Lancet*, 2: 87, 1942.

Shearer, JR; Roach, HI, y Parsons, SW: Histology of a lengthened human tibia. *J Bone Joint Surg*, 74B: 39, 1992.

Sledge CB y Noble J: Experimental limb lengthening by epiphyseal distraction. *Clin Orthop*, 136: 111, 1978.

Sofield, HA; Blair, SJ, y Millar, EA: Leg lengthening. A personal follow-up of 40 patients some years after the operation. *J Bone Joint Surg*, 40A: 511, 1958.

Songer, JE; Kendra, JC, y Price, CT: Pediatric applications of a dynamic axial external fixator. Scientific exhibit, annual meeting. American Academy of Orthopaedic Surgeons. Atlanta, Georgia, 1988. *Contemp Orthop*, 19: 477, 1989.

Spängler, HP; Holle, J, y Braun, F: Die verklebung experimenteller leberverletzungen mittelshochkonzentrierten fibrin. *Acta Chir Austr*, 7: 89, 1975.

Strubbe, W; Citroen-Brat, MC; Hendrikx, MM, y Vlietstra-Zock: N Psychological and psychiatric aspects in lengthening procedure of children. En: International Orthopaedic Symposium. Leg lengthening inequality, Utrecht, 1984.

Tarlov, IM, y Benjamin, B: Plasma clot and silk suture of nerves. Surg Gynecol Obstet, 76: 366, 1943.

Tercedor, J; Crespo, V; Acosta, F; Campos, A, y Fernández, E: Alargamiento tibial por distracción epifisaria proximal. Rev Orthop Traum, 32: 412, 1988.

Tetsworth, K; Krome, J, y Paley, D: Lengthening and deformity correction of the upper extremity by the Ilizarov technique. Orthop Clin North Am, 22: 689, 1991.

Tjernström, B; Thoumas, K, y Pech, P: Bone remodeling after leg lengthening: Evaluation with plain radiographs and computed tomography and magnetic resonance imaging scans. J Pediatr Orthop, 12: 751, 1992.

Trueta, J: The role of the vessels in osteogenesis. *J Bone Joint Surg*, 45B: 401, 1963.

Trueta, J: Blood supply and the rate of healing of tibial fractures. *Clin Orthop*, 105: 11, 1974.

Trueta, J: La estructura del cuerpo humano. Estudio sobre su desarrollo y decadencia. Editorial Labor. Barcelona, 1975.

Tucker, HL; Kendra, JC, y Kinnebrew, TE: Tibial defects. Reconstruction using the method of Ilizarov as an alternative. *Orthop Clin North Am*, 21: 629, 1990.

Van Roermund, PM; Ter Haar Romeny, BM; Schoonderwort, GJ; Brandt, CJWM; Sijbrandij, S, y Renooij, W: The use of computed tomography to quantitate bone formation after distraction epiphysiolysis in the rabbit. *Skeletal Radiol*, 16: 52, 1987.

Vilarrubias, JM; Ginabreda, I, y Jimeno, E: Lengthening of the lower limbs and correction of lumbar hyperlordosis in achondroplasia. *Clin Orthop*, 250: 143, 1990.

Villa, A; Paley, D, y Catagni, MA: Lengthening of the forearm by the Ilizarov technique. *Clin Orthop*, 250: 137, 1990.

Wagner, H: Operative Beinverlängerung. *Chirurgia*, 42: 250, 1971.

Wagner, H: Technik, und indikation der Operation Verkrümmung und Verlängerung von Oben und Unterschenkel. *Orthopäde*, 1: 59, 1972.

Wagner, H: Surgical lengthening or shortening of femur and tibia: Technique and indications. *Prog Orthop Surg*, 1: 71, 1977.

Wagner, H: Operative lengthening of the femur. *Clin Orthop*, 136: 125, 1978.

Wagner, H: Surgical lengthening of the femur. Report of fifty-eight cases.

Ann Chir, 34: 263, 1980.

Westin, G: Femoral lengthening using a periosteal sleeve. Report of

twenty-six cases. *J Bone Joint Surg*, 49A: 836, 1967.

Westin, W, y Sakai, DN: Congenital longitudinal deficiency of the fibula:

Follow-up of treatment by Syme amputation. *J Bone Joint Surg*, 58A: 492,

1976.

Wevdenskogo, SP: Distraction epiphyseolysis of crural bones. *Ortop*

Traumatol Protez, 10: 53, 1974.

White, SH, y Kenwright, J: The timing of distraction of an osteotomy. *J*

Bone Joint Surg, 72B: 356, 1990.

Wilde, GP, y Baker, GCW: Circumferential periosteal release in the
treatment of children with leg-length inequality. *J Bone Joint Surg*, 69B: 817,

1987.

Williamson, S: A comparison of imaging techniques for leg lengthening osteotomies. *Radiography Today*, 57: 20, 1991.

Wilson-MacDonald, J; Houghton, GR; Bradley, J, y Morscher, E: The relationship between periosteal division and compression or distraction of the growth plate. *J Bone Joint Surg*, 72B: 303, 1990.

Winkquist, RA; Hansen, ST, y Pearson, RE: Closed intramedullary shortening of the femur. *Clin Orthop*, 136: 54, 1978.

Winkquist, RA: Closer shortening of the femur utilizing a new type of intramedullary saw. En: Lotz, B (Eds): *Intramedullary nailing*. New York: Thieme-Stratton, 1982: 214-221.

Wittmoser, ER: Zur druckosteosynthese. *Arch Klin Chir*, 56: 229, 1953.

Wood WL y Zlotzky N: Congenital absence of the fiula: Treatment by sime amputation, indications and technique. *J. Bone Joint Surg*, 47A: 1159, 1965.

Yasui, N; Kojimoto, H; Shimizu, H, y Shimomura, Y: The effect of distraction upon bone, muscle, and periosteum. *Orthop Clin North Am*, 22: 563, 1991.

Yi-Shiong Hang, y Jiun Shong Shih. Tibial tengthening. A Preliminary report. *Clin Orthop*, 6: 94, 1977.

Young, RW: Cell proliferation and specialization durint endochondral osteogenesis in young rats. *J Cell Biol*, 14: 357, 1962.

Young, JWR; Kovelman, H; Resnik, ChS, y Paley, D: Radiologic assessment of bones after Ilizarov procedures. *Radiology*, 177: 89, 1990.

Young, JWR; Kostrubiak, IS; Resnik, CS, y Paley, D: Sonographic evaluation of bone production in the distraction site for Ilizarov limb lenghening procedures. *AJR*, 154: 125, 1990.

Zavijalov, PV, y Plaskin, JT: Elongation of crural bones in children using a method of distraction epiphysiolysis. *Vests Khir Grekova*, 103: 67, 1967.

Zavijalov, PV, y Plaskin, JT: Distraction epiphysiolyis in lengthening of the lower extremity in childres. *Khirurgija* , 44: 121, 1968.

Zilch, H, y Noffke, B: Beeinflubt der fibinkleber die knochenneubindung. *Unfallheilkunde*, 84: 363, 1981.