

The use of 3D models in the pre-operative evaluation of the treatment of the foot congenital flat footMaredi E¹, Stallone S¹, Trisolino G¹, Di Gennaro G L¹, Gallone G¹, Zarantonello P¹, Stilli S¹, Osti F² and Frizziero L²¹IRCCS Rizzoli Orthopaedic Institute, Italy²University of Bologna, Italy:department of Industrial Ingeneering

The flat foot is a complex multi-planar deformity from the leveling of the longitudinal plantar vault of the foot. From 2016 to 2017, 62 feet affected by tarsal synostosis. Of these 62 feet, for 26 we required a 3D model to be able to study preoperatively, 2 of which to be used directly on the operative field, after sterilization. Then we evaluated and compared between the 2 groups, in patients who had at least 12 months of follow-up: operative time, intraoperative complications, extra-operative complications, pain and return to daily activity / sport, surgical time and satisfaction of the surgeon. The obtained data, collected at a mean follow-up of 14 months (min 12, max 30), do not show an improvement of the clinical condition, expressed as pain (VAS without 3d: 9; VAS with 3d: 9) and recovery of sport activity (FADI/FAAM without 3d: 91%, with 3d: 89%). Also the extra-operative complications, such as infections, deformity in persistent flatness or breaking of the synthesis media, are unchanged in the two groups (without 3d: 2/36 - 5%, with 3d: 1/25 - 4%). An improvement was however obtained in the reduction of the operative time, with a decrease of 10 min of intervention mean (without 3D: 55 min of average, with 3D: 45 min of average) and of those that are intraoperative complications (without 3D: 8%, with 3d: 3%). The satisfaction of the surgeon, assessed with specific satisfactory survey showed a clear satisfaction in the use of 3D models, thanks to which it was possible to isolate the synostosis in a shorter time and a more rapid resection of the same. The creation of 3D models (scale1:1) of the pathology is decisive in the planning of a better surgical strategy for the patient, in the calculation of the size of the synostosis and in the implementation of specific cutting guides for the patient. All this translates into a shorter surgical and infectious risk of the patient, with also good signs of satisfaction of the surgeon.



3D CTscan and 3D model

Recent Publications:

1. Dekker T J, Steele J R, Federer A E, Hamid K S and Adams S B Jr. (2018) Use of patient-specific 3D-printed titanium implants for complex foot and ankle limb salvage, deformity correction, and arthrodesis procedures. Foot Ankle Int. 1:1071100718770133.

2. Park H J, Wang C, Choi K H, Kim H N (2018) Use of a life-size three-dimensional-printed spine model for pedicle screw instrumentation training. *J Orthop Surg Res.* 13(1):86.
3. Morasiewicz P, Burzyńska K, Orzechowski W, Dragan S Ł, Dragan S F and Filipiak J (2018) Three-dimensional printing as a technology supporting the treatment of lower limb deformity and shortening with the Ilizarov method. *Med Eng Phys.* pii: S1350-4533(18)30063-8.
4. Gadia A, Shah K and Nene A (2018) Emergence of three-dimensional printing technology and its utility in spine surgery. *Asian Spine J* 12(2):365-371.
5. Vaish A and Vaish R (2018) 3D printing and its applications in orthopedics. *J Clin Orthop Trauma* 9(Suppl 1):S74-S75.

Biography

Maredi E Studied degree at School of Medicine in Bologna Italy and Specialization in Orthopedics with full marks. She works at the paediatric orthopedics department of the Rizzoli orthopedic institute. Author of numerous publications in the paediatric and vertebral field, such as Surgical treatment for scoliosis associated with rare disease and Neurofibromatosis type I and multiple myeloma coexistence: A possible link? she has participated in numerous courses and conferences as a speaker or learner. Winner abstract for young category at the Italian Scoliosis Group (GIS). The major field of application at the moment is the paediatric deformity from the spine to the foot.

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