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From regeneration to substitution: Algorithm of treatment of non-unions and bone defects

Non-union and bone defects of long bones are difficult complications treating fractures. We propose a new classification and a new strategy that could give significant information to the orthopaedist for a good management of these complicated cases and permit to create comparable study groups for research purpose. In 2008 we published a new classification for non-unions: the Non-Union Scoring System (NUSS). The NUSS doesn't consider only the radiographic aspects of the non-union but take in consideration all the risk factors that contribute to this complication analyzing the whole patient (bone quality, primary injury, number, invasiveness and adequacy of previous interventions, soft tissues status, ASA grade, clinical infection status, smoking status, use of drugs, blood test, diabetes). All the factors included in the scoring system have an impact on the complexity and difficulty of treatment of any non-union. The NUSS recognizes four group of complexity:

- score from 0 to 25 should be considered a straightforward non-union and should respond well to standard treatments; usually the problems is mainly biomechanic; the more common treatment is choosing a different system of fixation.
- score from 26 to 50 should require more specialised care; usually the problem is both biological and mechanical. The treatment require the correction of the fixation associated with a biological stimulation obtained with CEMP, ESWT or biotechnologies such as mesenchimal stromal cells or growth factors or scaffold in monorail therapy.
- score from 51 to 75 require specialised care and specialised treatments; it's a complex problem characterized by a impairment of both biological and mechanic conditions, usually is required the resection of the non-union and consequently a bone defect must be treated. Next to traditional treatments, such as bone transport with external fixator, autologous iliac's crest grafts or microvascular fibula's graft, in this situation is indicated the use of biotechnologies (cells, scaffold and growth factors) according to the principles of the "biological chamber" and the "polytherapy".
- score from 76 to 100 may be candidates for the primary amputation, arthrodesis, prosthesis, o mega-prosthesis depending on the severity of the loss of substance and the anatomical localization.

We think that a "ladder strategy" based on the complexity of patients that starts from reconstruction and ends with substitution of the affected limb could be a good option in these difficult cases in order to return these patients to function.

Biography

Giorgio Calori Maria has completed his education of Medicine and Surgery University of Milan in 1982; 1987 Specialization School in Orthopaedics and Traumatology University of Milan; 1990 Specialization School in Physical Therapy and Rehabilitation, University of Milan; 1994 Specialization School in Hand Surgery University of Florence. At present he is working as Chairman of Complex Operative Unit of Orthopaedic Reparative Surgery and Risk Management, G. Pini Orthopaedic Institute, piazza Cardinal Ferrari 1, University of Milan. Also he works as a Professor at the University of Milan at the Graduate School of Orthopaedics and Traumatology and tutor of the course on "Biological processes in the repair of fractures and in non-unions" since 2004. He is the Professor at the University of Milan in the course in Medicine and Surgery of the course on "Human Anatomy" since 2003 and of the course on "Orthopaedics and Traumatology" since 2013. He is in relation with scientific societies as President of the European Society of Tissue Regeneration in Orthopaedics and Trauma (ESTROT.) He is the President overseeing the super-specialist Society for osteosynthesis CIO (Italian Osteosynthesis Club) of the Italian Society of Orthopaedics and Traumatology (SIOT). He is the President overseeing the Lombardy Section SLOTO of Italian Hospital Orthopaedics and Traumatologists. He is the Former President of the Tissue Regeneration Commission of the Italian Society of Orthopaedics and Traumatology (SIOT). He is the member of the international Advisory Board on biotechnologies and regenerative medicine. He is the President of the National Board for regenerative medicine.

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