Closed technique of ankle fusion using circular external fixation

R. Mora, B. Bertani, S. Lucanto, L. Pedrotti

Dept. of Orthopedics and Traumatology,
Città di Pavia Institute,
University of Pavia, Italy

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Percutaneous methods of ankle fusion can be performed using a wide variety of procedures (including arthroscopy–assisted arthrodesis, arthrodesis with mini-arthrotomy approach)
Moreover, stabilization of the arthrodesis by means of external fixation is considered an effective alternative to internal fixation methods.
EFFECT OF PERSISTENT PRESSURE ON THE ARTICULAR CARTILAGE
An Experimental Study

ANTONI TRIAS, * OXFORD, ENGLAND

From the Nuffield Orthopaedic Centre, Oxford
Ultrastructural quantification of cell death after injurious compression of bovine calf articular cartilage

P. Patwardhan, V. Gaschen, E. E. James, E. Berger, S. M. Blake, M. W. Lark, A. J. Grodzinsky, and E. B. Hunziker

*Continuum Electromechanics Lab, Center for Biomedical Engineering, Massachusetts Institute of Technology, Cambridge, MA  \+TITI Research Institute for Dental and Skeletal Biology, University of Bern, Switzerland  \+Department of Musculoskeletal Diseases, GlaxoSmithKline, King of Prussia, PA
Deterioration of Articular Cartilage Caused by Continuous Compression in a Moving Rabbit Joint

A Light and Electron Microscopic Study*†

BY THOMAS L. GRITZKA, M.D.‡, PORTLAND, OREGON, LOUIS R. FRY, M.D.§, ROY L. CHEESMAN ¶, AND ANGELA LAVIGNE, PH.C.$, SEATTLE, WASHINGTON
First phase:
18 cases of post-traumatic or degenerative ankle arthritis treated with an arthrodesis by means of a mini-arthrotomy anterior approach and stabilization with circular external fixation

Second phase:
8 cases treated with completely closed procedure (application of an Ilizarov apparatus, gradual correction of residual deformities and joint compression)
Patients and methods

8 cases treated between 2007 and 2010

follow-up: 2-6 years

5 men and 3 women

mean age: 53 years (range: 41-64 years)

3 patients previously treated with internal osteosynthesis for tibial pilon fracture.
Patients and methods

Removal of the hardware if present

Application of the fixator (two-ring frame on the tibia and a foot ring on the foot)

In cases associated with a simple or complex joint deformity, gradual correction was performed, then only adequate compression was applied

Weight bearing allowed after 3 days
Results

wires broke in 4 cases

superficial infection at some wire tracts in 3 cases

no major complications

deformity correction and fusion obtained in all patients in an average of 105 days (range: 90-125 days)

results (evaluated with the AOFAS scale and with the Paley rating system) were very good
Conclusion

This completely mini-invasive evolution of the mini-arthrotomy technique is contrary to the classic belief that joint fusion can occur only with removing all of the cartilage and only on broad and flat cancellous bone surfaces.

In these cases, because of the process of gradual degradation caused by continuous compression, the cartilage breaks down and is eroded away, and the opposite bone surfaces can gradually fuse together.
Conclusion

The stabilization with circular external fixator shows the advantages of stability, assembly modularity, multiplanar control, possibility of gradually correcting the deformities and performing a continuous compression, early weight bearing and easy removal of the external frame.
Conclusion

This technique proved to be in selected cases a bloodless, simple and effective method.

Osteotomy and bone grafting are not necessary, no limb shortening is created and there is no need for a tibial corticotomy in order to obtain tibial lengthening.