

## Book reviews

### ***MRI of the foot and ankle***

Andrew L Deutsch, Jerrold H Mink and Roger Kerr (editors), 378 pages, Raven Press, New York, 1992  
ISBN 0-88167-899-6

Initially, musculoskeletal MRI was mainly used for bone and soft tissue tumor staging and for mapping of the soft tissue structures of the knee. Later, the technical development made it possible to diagnose shoulder disease by means of MRI. This book further expounds the capabilities of MRI in musculoskeletal disease, and reflects the authors' experience of more than 4000 examinations of the foot and ankle.

The opening chapter is devoted to the physical basis of MRI. It also deals with other problems, such as artefacts, bioeffects of magnetic fields and safety recommendations. The problem of patients with metallic implants is cautiously covered, and a detailed table of such implants that contraindicate MRI is included. It also contains a table with recommended protocols for MRI examination of the foot and ankle.

In the second chapter, the normal anatomy of foot and ankle muscles, ligaments, vessels and nerves are described, as a rule in three planes. A surprising detail is that only the MRI sections of the toes are accompanied by corresponding anatomic sections.

The following chapters cover traumatic injuries of bone and osteonecrosis, osteochondral injuries of the talar dome, tendons, ligaments, bone and soft tissue infection, and tumor and tumor-like lesions. There is also a chapter on muscle injuries of the lower leg,

including compartment syndromes and other muscular disorders. There is information on the physics and clinical use of MRI angiography of the lower extremity and foot, and a chapter on mechanics of the foot is also included. The final chapter is devoted to miscellaneous conditions, such as entrapment neuropathy, i.e., interdigital neuroma, tarsal tunnel syndrome and deep peroneal nerve entrapment, as well as plantar heel pain and articular diseases.

The strength of this book is the thorough clinical correlation to MRI and radiological findings. In the whole book, high resolution imaging, pulse sequence selection and state-of-the-art techniques for optimizing diagnostic image quality as well as the value of STIR technique are repeatedly emphasized. The text and illustrations are excellent. Each chapter is followed by a more or less complete reference list, and the index is well organized. This book is recommended to all clinicians and radiologists interested in foot problems.

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## **Skeletal muscle structure and function. Implication for rehabilitation and sports medicine**

Richard L Lieber, 292 pages, William & Wilkins, Baltimore, 1992

ISBN 0-683-05026-5

The first 3 chapters out of 6 describe skeletal muscle structure, physiology and production of movement. The information in these chapters on basics is clinically relevant for orthopedic surgeons. An example of this is the usefulness of the 2 figures describing the cross-sectional area and fiber length of each of the muscles in the human arm and lower limb. The figures match architectural properties between muscles, and are helpful when a muscle is chosen to be transferred to perform the function of another muscle whose function has been lost.

In the following chapters the author describes skeletal muscle adaptation to increased and decreased use. He also shares his wide experience in the field of electrical stimulation. In the last chapter, skeletal muscle response to injury is discussed. Muscular regeneration and response to exercise-induced injury (e.g., eccentric muscular activity) are also discussed. Each chapter is followed by references which are up to date, and a useful index completes the book.

The author guides the reader in a systematic way through sometimes difficult information, and explains it in an easy way. The text reflects his wide experimental experience and his knowledge about skeletal muscle tissue. You will find all basics that are worth knowing for an orthopedic surgeon in this book.

This is an excellent text, which I enjoyed reading. It can be highly recommended for medical students, physical therapists, nurses, and for everybody working within the fields of orthopedics, hand surgery, sports medicine, rehabilitation and related research. It is also a useful book for every physician who wants to brush up his/her old knowledge within the field, and for everyone who prescribes neuromuscular exercises for patients.

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## **Knee ligaments—structure, function, injury, and repair**

Dale Daniel, Wayne Akeson, John O'Connor, 558 pages, Raven Press Ltd, New York, 1990

ISBN 0-88167-605-5

The authors state that "the ligament field is on the move" as a reason for writing this book and, certainly, many clinical observations have hitherto not been provided with a scientific background other than a correlation between anatomical dissections, clinical examination and surgical findings. The fundamentals from the 1970s, mainly related to biomechanics of the joint, have, during the 1980s, been enlarged by the results from a number of investigations utilizing different new techniques, and most traditional knee "bibles" need an update. This book covers most topics on ligaments, with short but relevant reviews ending in frontline questions and followed by presentation of specific

studies, often performed by the authors or by invited co-authors.

The first part presents an abstract on clinical examination, some case studies and basic principles of knee ligament surgery. It contains some questionable statements, for example, that a pivot shift "consistently" is present in the relaxed patient after an ACL disruption. That is not in agreement with either in vitro studies or our clinical experience. No description of the performance of different pivot shift tests is included, while the more simple valgus stress test is well covered both in the text and in a figure. The patient scenarios according to the authors' treatment principles are good for exemplifying the individualized

selection of treatment, including both surgery and neuromuscular rehabilitation. A shortcoming is to mention an orthopedic company by name 5 times on 2 pages without any added information, but to omit the rationale for selecting a higher pre-tension of a graft than is suggested by animal experiments or its interrelation with the knee flexion angle.

The second part deals with anatomy, ligament structure, biochemistry and physiology. The “connect” function of these connective tissues by various techniques is brilliantly detailed and the different material characteristics of various tissues are described. After reading this section, nobody will any longer think of a ligament as a passive rope that “needs to be fixed” mechanically, but rather as a fragile living structure that needs assistance to recover.

The third part on ligament function includes sensory aspects, studies on mechanical properties, and knee kinematics. The basics of force vectors needed to understand the 3-dimensional motion limits and coupled motions, as well as cutting studies on different ligaments’ effect on motion are nicely described. The 4-bar linkage principle and the interrelation between the bony surfaces and the ligaments is detailed by knee modeling. This computerized technique, based on geometrical and mechanical in vitro measurements with a great potential, is well utilized by the authors to describe different forces in the ligaments, muscles and joint surfaces, as well as the location of the motion axis.

Despite the shortcoming of being 2-dimensional, and the fact that biological variation affects these calculations, this part of the book gives lots of information. When gait analysis, including motion registrations, EMG, and force plate registrations, is combined with the geometric knee modeling even more information is gained on the close coordination between muscle activity and ligament function to maintain normal joint kinematics. However, the authors do take into consideration the disadvantages of implanted strain gauges, but not the great advantage of this technique for performing direct measurements in vivo during physiological stresses on the knee. Results from such studies would have improved this section.

The fourth part describes the ligament response to stress, stress deprivation, and ligament healing after injury. The authors emphasize the importance of movement and limited stress in order to avoid the neg-

ative effect on muscles, ligaments, cartilage and bone from stress deprivation. Maybe the experience from animal studies should be taken into consideration also in patients, in whom we sometimes see very thin and slack structures, but sometimes the injured ligament has an impressive bulk under tension. Poor healing potential of the ACL has been shown clinically and also experimentally by the authors, who speculate on an enzymatic hostile environment when the intra-articular, but extra-synovial ACL is exposed by the frequently concomitant tear of the synovial sheet. A graft in the same environment undergoes necrosis with hypocellularity, followed by cell proliferation from the outside and remodeling into a ligament-like tissue which is nicely demonstrated in chapter 20. It is remarkable that “living” but injured tissue has a worse outcome than transplanted dead tissue as a matrix for repopulation of extrinsic cells.

The review of non-operative treatment contains many percentage figures from different studies on the patients’ ability to return to demanding sports as a “result” of treatment, which can be questioned due to the risk of secondary lesions and joint deterioration. Little is, however, said about different treatments, ranging from none to sophisticated neuromuscular training programs.

One major complication of surgery is postoperative joint stiffness which by all means should be prevented by careful surgical technique and early mobilization. If problems arise, early recognition and aggressive treatment are important. A higher rate is reported when surgery is performed in acute injuries, and the authors have reduced the incidence from 30 percent to about 10 percent by reducing the period of immobilization and changing the casting position from 30° to 0° of flexion. The presented results after reconstructive ACL surgery remind us that a normalized joint laxity and overall limb function is hard to achieve.

Much work has been laid down on the editing of this book, making it a pleasure to read. It can strongly be recommended to all orthopedic surgeons interested in the knee.

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