

Book reviews

Mechanics of Human Joints. Eds V Wright, E L Radin. (Pp 465; \$185.) New York: Marcel Dekker, 1993. ISBN 0 8247 8763 3.

This volume reviews current knowledge of joint mechanics and certain closely related topics, including muscle physiology and joint neurophysiology. Chapters on the normal structure and function of soft and hard tissues and synovial fluid are followed by pathophysiological considerations and the application of mechanical considerations to specific treatments.

The first thing to say is that there is a lot of very good material here, and anyone who aspires to understand the structure and function of joints should make sure they have access to this volume. This should include all trainees in orthopaedics and rheumatology. In this respect I would agree with John Goodfellow's remarks in the foreword. To treat locomotor problems without keeping up to date with the physiology is like being an ophthalmologist without understanding optics and tantamount to posing as a car mechanic without knowing the different functions of oil and petrol.

A compendium of essays such as this is inevitably biased by the editors' interests, one of which is rheology. Perhaps the outstanding essay is that by Unsworth, which combines readability with a rigorous critique of the alternative theories of joint lubrication. Following a flurry of debate 10 years ago these theories are now seen as all being relevant to real life. Cartilage mechanics are given less space. An area that perhaps might have had more attention is the interaction between mechanical stresses and cell behaviour, which over a lifetime is critical to the maintenance of a functioning joint. The coverage of pathology and treatment is obviously selective, but the contributions are all relevant and well written. The analysis of vibration shows how rigorous mechanical analysis can be applied to assessment of risk in occupational disease. The accounts of ligament reconstruction and principles of joint prostheses take one through the practical problems of restoring mechanically sound joints, and the way in which solutions have evolved.

There are weaknesses in the way in which some subjects are tackled, and perhaps most notably that of soft tissue mechanics. In a few cases major advances in cell biology and extracellular matrix biochemistry seem to have been ignored, perhaps reflecting the common problem of compartmentalisation of publications. Weaknesses of analysis, however, are to some extent inherent in the process of growth of knowledge. In the section on joint stiffness Helliwell freely admits that a large amount of work was done before the laboratory scientists stopped to think about whether their idea of stiffness was the same as that of the patient. It turns out that it might have been quite different.

Awareness of this sort of problem is part of the message to be drawn from a book like this. It applies also to the lubrication debate. There are three phases in the analysis of a physiological problem. Firstly, a question is posed about how something works. Secondly, a conceptual model is devised, which points the worker to an experimental system. Thirdly, algebraic and geometric methods are devised and used to interpret the findings in that system. Very often stage three runs ahead of stage two, where fatal flaws may have been introduced. Volumes of numerical data are useless if they represent measurements of something which is not analogous with the living organ. Study of the structure/function relationship in the soft tissues of joints has been littered with such problems; nevertheless, this review clearly shows how these are gradually weeded out and a consensus view is eventually reached.

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Knee Meniscus: Basic and Clinical Foundations. Eds V C Mow, S P Arnoczky, D W Jackson. (Pp. 204; \$111.50.) New York: Raven Press. 1992. ISBN 0 88167 895 3.

Every now and then you come across a book that you wish you had had the opportunity to read years before—this is one. It is an excellent synopsis of the biology of the meniscus, written in an easily readable style. It acts as an introduction and remains as a comprehensive study to return to again.

It is well and generously illustrated with good diagrams and illustrations, which is inevitably reflected in the price. There is some repetition between chapters, but this allows them to be read as separate articles, as well as components of the book.

The book divides into two parts. Eight chapters cover biomechanics, cell biology, and anatomy, presenting a format that allows emphasis on key aspects, but full inclusion of detail. The engineering perspective is particularly valuable, with chapters on the movement of the meniscus during knee flexion, and the theoretical approach of finite element analysis of the stress strain patterns of meniscus being particularly good, even if challenging to the clinical mind! Reading the first half, we remember that the biomechanics of the knee are complex, but there are ways of understanding them. We are reminded to go back to basic anatomy and think about function with a clear anatomical concept of how movement occurs. This in turn emphasises the importance of approaching understanding of malfunction and disease from the perspective of basic science.

The second section discusses pathology, the value of meniscectomy, and the different interventional procedures possible. After this demonstration of the importance of the meniscus to the functional integrity of the knee, ways of reconstructing and replacing the meniscus are introduced in the final chapters. The potential for allograft meniscal transplantation and prosthetic replacement are discussed. The rapidly developing technology of meniscal surgery is recognised, and a chapter deals with laser applications. The second part focuses on the surgery of meniscal tears ending with an appeal for coordinated research into meniscal transplantation.

There is an inevitable compromise on what can be included and excluded. For the physician, there is perhaps under-emphasis of the role of the meniscus in the development of arthritis, particularly osteoarthritis, but the major omission must be lack of detailed discussion of the investigation of the meniscus. Magnetic resonance has revolutionised the *in vivo* study of the meniscus, and even though images of functional scans are shown, more space might have been set aside for this exciting and controversial area. Perhaps it justifies its own book. More might have been included on the clinical problems and pathology of the meniscus. There is no discussion of the epidemiology of meniscal problems nor of why the structure is a preferred site for crystal deposition.

The specialist nature of the book means that it focuses on people working on the knee . . . as clinicians or investigators. The format of linking structure, function, pathology, and surgery, however, provides an insight into mechanical aspects of joint function that deserve much wider appreciation. For this, the book is to be recommended to anyone interested in joints. It would, for example, provide a stimulus to the clinician who is interested in joints but not necessarily the knee. The elegance of demonstrating anatomy, function, and biomechanics reminds us of how complex the joint is as an organ . . . a lesson that must carry over to other joints. That perspective warrants wide reading of this compact, well presented book, which should become a readily available reference on a small but important piece of fibrocartilage in the knee!

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