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Navigation and MIS in Orthopedic Surgery
Navigation and MIS in Orthopedic Surgery

With 515 Figures and 56 Tables
Foreword

The reader is enthusiastically encouraged to tackle this second edition text in two ways. The first is simply to scan chapters with their introductions, summaries and conclusion points. Second, is to delve into those sections of seeming greater interest depending upon one's specialty and role.

The expansion and quality of this material speak to the success of the first edition by these editors and many similar authors. In addition, the continued and enlarged interest in computer assisted Orthopedic surgery indicates the relevance and enduring importance of this advance in our field of musculoskeletal surgery.

I suggest that no other discipline in surgery is so appropriately suited to computer assistance including robotic performance. Orthopedics has always seemed unique to this author in that it focuses more than any other medical field on gross physical, mechanical structure. We deal nearly exclusively in physical repair of broken elements, rearrangement of deformed ones, and resurfacing or refurbishing those that are diseased in a way that has altered their mechanical integrity, shapes, and other structural aspects.

Certainly there are biochemical, physiologic, cell biologic, and immunologic even infectious and neoplastic issues involved to major degrees in the injuries, treatments and basic pathology of all that we treat. Our methods attempt to take advantage of these aspects of the biology and structure involved. Nonetheless, what we actually do in the operating room, what we spend so many years learning to do safely, correctly and accurately is to rebuild and repair the physical structures which are the musculoskeletal system. It is my belief that this rather gross structural character of Orthopedic surgery is what makes so ready-made for computer assistance, even robotic preparation and interaction.

The anatomic and physiologic nature of the human body makes physical intervention much more variable and complex than tasks done on inanimate objects in factories. These factors also present more difficulty than addressing many problems and studies in physical and biological science. It was only natural that computer assistance in general and the employment of robots in particular factory processes were first seen in those applications. However, the need for precision is as great and in many ways greater when we commence treatment of the deranged or diseased human structure.

Clearly there is resistance to the introduction of these hi-tech changes into our field. We first fear their cost, second their complexity as it relates to the uninitiated user, and also the sense of losing control of our surgical processes. Nonetheless, the need is there – the need to maximize the accuracy, consistency, and safety of our surgical procedures.

It is this writer’s prediction that our future, within the next 10 to 15 years will see an evolution in computer applications and mechanical, plus robotic methods that will revolutionize the way our surgeries are performed. It will be routine practice that our procedures are done thru incisions that are only as large as necessary to either introduce or remove the material which is involved in an operation. And, this surgery will be done with maximal computer assistance in the form of navigation and other aspects. Furthermore, retraction, tissue cutting and reformation, as well as implant placement, will be done by robots. Like it or not today, the importance of accuracy and consistency, together with technologic changes and software development will allow and drive this revolution. That said, it is time for all of us to understand the bases of these techniques and appreciate the applications and success of the methods developed so far.

Kenneth A. Krackow, MD
In memoriam Thomas Günther from Springer, who unexpectedly died during this book project.

He will be greatly missed.
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Preface

Computer assisted Orthopedic surgery has made significant advances since our first textbook was completed in 2003, not only in refinement of existing methods but in newer ideas such as early robotic applications and validation concepts. The basic platforms from which we work have been long established fixtures in the computer and technology world. One might conclude that the medical profession has been late to get into this game. Machines aren't necessarily better than humans when it comes to artistic creations, but they can certainly have become more reproducible and precise. Any surgeon who dismisses this concept faces the likely hood of becoming a surgical anachronism. Surgical navigation is an enabling technology that has limited side effects and promises to advance the art of Orthopedic surgery in ways not imagined. This contrasts with Minimally Invasive Surgery which is a new and different surgical technique done through less intrusive methods that enhance postoperative recovery and minimize tissue damage. Many surgeons have learned that MIS techniques can be difficult and may add significant complications to previously straight forward operations. This textbook importantly discusses the marriage of surgical navigation with minimally invasive surgery as we believe »virtual reality« in surgery makes MIS a safer venture.

The other important point we would like to make about these technologies, is that they are fickle mistresses and takes no hostages. Scientific advancement celebrates only the innovators and practitioners of today and tomorrow, not of yesterday. There are no 'giants' in this field comparable to the days of Mueller, Charnley and Insall who literally held court throughout their lifetimes following the hegemony of their primary innovations. In contrast, going to the 'computer store' to buy your first new personal computer will quickly put you on equal footing with the guy who has been doing it for ten years. This simple collaborative fact makes computer assisted surgery extremely attractive to the future generation of »millenial« Orthopedic surgeons, who thrive on teamwork and system consensus. This is how they have been raised. The editors celebrate our friendship with all the world-wide group of contributors to this current volume and offer our gratitude for their participation in this exciting field.

October 2006
The Editors
James B. Stiehl, Werner H. Konermann, Rolf G. Haaker (Senior Editors), Anthony M. DiGioia III
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