

## Guest Editorial

Navigation was introduced into orthopaedics in the early 1990's when the first navigated pedicle screws were inserted. Where are we now, almost 15 years later? Only very few enthusiastic spine surgeons use navigation routinely. Despite continuous evolution of the technique, navigated hip replacements, osteotomies, knee ligament reconstructions and trauma surgeries belong to the armamentaria of a very small number of clinicians worldwide. It seems that knee replacement surgery is the only application gaining popularity in the orthopaedic community. Has the time of navigation in orthopaedics "come and gone"? I would like to think that the answer to this question is "No". Hence this special issue of the Finnish Journal of Orthopaedics and Traumatology.

The advantages of navigation are proven and well-documented. Randomized controlled trials (RCT) have shown that pedicle screws can be inserted more accurately and safely with computer assistance. In hip and knee replacement surgery, the position of the implant has a significant effect on clinical outcome. With navigation the average alignment of the components does not differ compared to conventional techniques, but the worst outliers are avoided. Moreover, two RCTs have shown that the alignment of the components is better in navigated total knee replacement than with using conventional mechanical jigs. Whether this better alignment leads to increased longevity of the prosthesis, needs to be proven in future long-term studies. These benefits, along with several others, have been widely discussed in the articles of this special issue.

The disadvantages of navigation are widely acknowledged, and also discussed herein. Clearly, as of now, an ideal navigation system does not exist. Such a system would need to be *versatile*, i.e. could be used for several applications *non-obtrusive*, i.e. would interfere as little as possible with the surgical performance *compact*, i.e. would not occupy too much space in an otherwise crowded operation theatre *robust*, i.e. would tolerate the many times harsh surgical environment, and *accurate*.

Moreover, navigation is time-consuming, and there is a certain learning curve during which a fair amount of patience and enthusiasm is mandatory for a successful introduction of the technique into the everyday clinical practice.

Accuracy is the mainstay of any navigation system. After all, this is what we are aiming at; to be able to perform surgeries better and more accurately for the benefit of our patients. It is therefore extremely important that all present and future users of navigation systems conscientiously study the accuracy of their navigation system in their hands. Due to the importance of understanding the principles of navigation and accuracy, a large part of this special issue is dedicated to these concepts.

Navigation is expensive. This is probably nowadays the most frequently used argument against it. In an era of increasing health care costs and funding problems, it might be difficult to justify acquisition of new costly technology. In the future, navigation systems will hopefully be available to an increasing number of colleagues by means of e.g. leases, or paying rent per operation. In this respect, cooperation with the manufacturers will be important.

The still widespread objection against navigation probably also stems from our prejudices. I'm convinced that the younger generation of orthopaedic surgeons, having been exposed to computers, computer games, PlayStation etc. from the early years, will accept this technology more willingly. Moreover, with navigation they will probably learn to insert pedicle screws, understand the concepts behind total joint replacement etc. much quicker than we did with traditional techniques.

I hope that this special issue will give the reader a good insight into the past, present and future of computer assisted orthopaedic surgery, and hopefully awaken new interest in the possibilities of this technology. Worldwide we certainly need new enthusiastic users to bring

navigation in orthopaedics to the next level. A couple of years ago 0.6% of the world's navigation tools were in Finland, so we also have room for improvement in the future.

I would like to thank the editors of the journal who so willingly accepted the idea of a special issue on navigation in orthopaedics and traumatology.

Finally, I owe my deepest gratitude to all the authors who have dedicated their time and effort for the success of this special issue. Without their contribution such an issue of world-class quality would have been impossible to achieve.

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