J Orthop Sci (2010) 15:435–436
DOI 10.1007/s00776-010-1500-2

JOURNAL OF
ORTHOPAEDIC SCIENCE
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Editorial

How to promote orthopedic basic science

Joji Mochida

Department of Orthopaedic Surgery, Surgical Science, Tokai University School of Medicine, 143 Shimokasuya, Isehara, Kanagawa 259-1193, Japan

In our country, Japan, the modern practice of clinical medicine was introduced first by German Christian missionaries and was later influenced by the Americans after World War II. Our system has continued to evolve into a high-quality system as we incorporate advances made throughout the world.

Pre- and postgraduate medical education has been changing in Japan over the past 10 years. As a result, more clinicians have been trained in shorter programs and more have left the university or larger regional systems, where they would have had more exposure to general clinical medicine. These young doctors may have insufficient training in general medicine because they specialize too early so that they can open a private clinic. In each clinical subject, such as internal medicine or general surgery, the student's abilities to diagnose, devise a treatment, and apply manual skills progress and become more complex. I think, however, that the future development of young doctors as clinicians will be limited if they focus mainly on learning only the manual skills for diagnosing and treating patients without understanding the underlying pathology for each individual patient. An analogy is building a large wooden building with a weak base.

Clinical medicine is a practical science that requires one to consider many facets within a working day. Clinical medicine is built on the application of basic science, including the simultaneous consideration of the anatomical, physiological, and pathological conditions of a patient. For example, the specialist in joint replacement works hard to provide excellent care of the patient when implanting an artificial joint, and this requires manual skill. However, because of the continual changes in artificial joint models offered by various companies, it behooves the doctor to think about the rights or wrongs of the biomechanical properties of an artificial joint or the joint substance itself, before using these prostheses.

A similar problem arises when using fixation of the spine to correct dynamic or static instability. When fixing the spine to resolve the pain caused by instability, a good result may be obtained in the short term. For example, fixation of the spine with spinal instrumentation can resolve low back pain in a patient with acceleration of disc degeneration as shown by imaging. However, the causes of low back pain are varied, and low back pain induced by the acceleration of disc degeneration is only one such possible cause. We know of many published cases where the patient underwent fixation surgery of intervertebral body spaces without first being examined to identify the cause of the low back pain. In such patients, surgery may not improve the low back complaint. If we think about the main functions of the spine as supporting body weight, housing the nervous system, and functioning as a joint, unnecessary fixation should be avoided when possible. I believe that this concept should be an important part of medical education. I have additional examples. Although many authors have reported that laser disc decompression can damage an intervertebral disc, the method has been accepted in the clinical field because it is a simple operative manual skill and because of the misperception that it is associated with few adverse effects on the patient's general condition. Another example is the explosive spread of the use of endoscopic spinal surgery throughout the world. However, paralysis has been reported after orthopedic endoscopic spinal surgery in a patient with a congenital anomaly of the nervous system. We believe that endoscopic spinal surgery is very risky and contraindicated in such patients.

Operative treatments comprise both a scientific aspect, which includes knowledge of the pathology for each patient, clinical diagnosis, and decisions about

Offprint requests to: J. Mochida
Received: May 10, 2010

treatment, and an aspect involving the manual skill needed to resolve the patient's condition. The manual skill can be considered an "art". During the past 15 years, advances in diagnosis using imaging technology, electrophysiological technology, molecular sciences, and immunohistological and histopathological technologies have contributed greatly to further development of the scientific aspects. At the same time, progress in imaging technology, computer-supported technology, surgical devices, biomaterials, and the application of biomechanical concepts have contributed to improvements in manual skill or the art of surgery. Of course, the development of new devices is based on the evolution of the science in itself.

The science and the art of surgery are equally important for the effective treatment of any patient. However, I am concerned when the art is given priority over the science in the clinical setting. Insufficient evaluation of a patient's pathology or attention to his or her complaints may produce an unsatisfactory outcome for the patient, such as the examples mentioned above. I am convinced that it is a mistake to view a patient's diagnosis and treatment solely from the perspective of the art of surgery.

I think that 70% of a good operative result is secured by the right diagnosis and proper decisions about treatment. The purpose of orthopedic surgery is to repair malfunctioning structures and thereby reduce or cure the patient's pain. However, by focusing only on the short-term follow up just after surgery or the imaging results, the doctor tends to think in terms of only a good or bad outcome after treatment. This is a pitfall that can distract the doctor. I emphasize the importance of identifying and understanding the patient's precise pathology before making a diagnosis and achieving a good clinical outcome.

It is essential that our orthopedic surgeons remain current with the latest scientific information and concepts in basic research. The Japanese Orthopaedic Association (JOA) established "The Annual Research Meeting of JOA" in 1986, and the meetings have played an important role in connecting orthopedic basic science to orthopedic clinical medicine. We Japanese orthopedic surgeons are very proud to have been involved in answering many of the fundamental questions investigated by research projects in basic science. Orthopedic basic science is now an essential base of the orthopedic clinical architecture. We cannot talk of the future of orthopedic clinical medicine without further developments in orthopedic basic science. I believe the JOA is responsible for promoting orthopedic basic science. To seed the orthopedic ground, we must nourish the bud, select the promising stalk, and support the young stem by showing that senior members of the JOA have a responsibility to promote orthopedic medicine. We now need to obtain a sufficient research budget to promote orthopedic science at both the clinical and basic levels. We also need to establish "tenure track positions" to promote basic science. The JOA should provide leadership for sophisticated trials.