

Department of Orthopaedic Surgery

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General Summary

Basic Research

The research performed in our Department of Orthopaedic Surgery, from studies on connective tissue cells to clinical application of basic research data, continues to be held in high regard both in Japan and abroad. This is reflected by the large numbers of papers published in English-language journals and of competitive scientific grants awarded to department members. The number of scientific awards received by our researchers has further increased in the last year, reaching 11 prizes accepted during the last 5 years. The highest priority of our research team is to carry out basic research that is readily applicable to clinical practice, not just that which deals only with basic science itself.

Clinical Research

An approach in which basic studies are carried out with clinical practice in mind and in which clinical research is strongly based on basic science has been proven valid by the results of many collaborative multicenter projects. We continue to cultivate and to present to the world our department's vision that an orthopaedic surgeon dealing with bones, cartilages, blood vessels, ligaments, tendons, and skin shall find answers to the questions of everyday clinical practice through basic laboratory research. This new concept of orthopedic surgical practice has started to be incorporated into evidence-based research: 2 of our researchers have been appointed authors of bone metabolism-related clinical guidelines.

Research Activities

Arthroscopic Bankart repair for recurrent shoulder dislocation in patients older than 40 years

Clinical features and results of arthroscopic surgery were evaluated in patients older than 40 years who had sustained recurrent dislocations of the shoulder without a full-thickness tear of the rotator cuff. Three-fourths of the patients had sustained the first dislocation in their 20s. The mean Japan Shoulder Society Shoulder Instability Score was 51 points before surgery and reached 92 points at the final follow-up. The postoperative limitation of range of motion was decreased with the procedure.

Isolated avulsion fracture of the lesser tuberosity of the humerus in an adolescent tennis player

An avulsion fracture of the lesser tuberosity of the humerus was diagnosed in a 17-year-old tennis player. He began to feel pain on stroking 4 years before admission. Pain was induced by elevation and internal rotation of the shoulder. Arthroscopy showed impingement of a bony fragment between the glenoid rim and the lesser tuberosity of the humerus. The bony fragment was surgically removed, and the subscapularis muscle tendon was repaired.

Spondylolisthesis of the lumbar spine in patients with severe osteoarthritis

We investigated the incidence of spondylolisthesis of the lumbar spine in patients with severe osteoarthritis. Spondylolisthesis was identified in 57% of patients with osteoarthritis of the knee and in 20% of patients with osteoarthritis of the hip. Lumbar disorders should be considered when patients complain of pain around the knee and when severe osteoarthritis is diagnosed with radiographic findings.

Prevention of dislocation after primary total hip arthroplasty with a modular femoral stem

Rotational deformity of the proximal femur remains a common problem after primary total hip arthroplasty in Japanese patients. The deformity can result in postoperative dislocation. The rotation-free modular system used for total hip arthroplasty in Japanese patients produces promising results in regard to preventing postoperative dislocation.

Patient-specific templating method in total knee arthroplasty: A prospective study of the accuracy of different patient-specific bone cutting guides

Preoperative and intraoperative patient-specific templating has gained attention as the next technological development after computer-assisted surgery navigation systems in knee surgery. In our department, we have been evaluating the accuracy of implant positioning during total knee arthroplasty with patient-specific bone cutting guides and are performing a comparative study against the computer-assisted navigation system. The evaluation also includes a comparative trial against conventional surgery, analysis of 3-dimensional reconstructions, and the development of more precise preoperative planning software. The comparative analysis on accuracy of different patient-specific cutting guides is being performed in a prospective manner.

Examination of hallux rotation in hallux valgus

We examined rotations of the hallux in patients with hallux valgus by comparing coronal computed tomographic images of these patients with those of a control group of patients and examined the degrees of rotation of the first and second metatarsals and the proximal phalanx of the hallux. Our results indicated that hallux rotation is caused by strain of the soft tissue around the metatarsophalangeal joint.

Collagen cross-linking and abnormalities of bone metabolism in osteoporosis and diabetes

Collagen cross-linking, a major posttranslational modification of collagen, plays many important roles in the biological and biomechanical features of bone. Our recent basic and clinical investigations of collagen cross-links seem to open a new chapter for general medicine as well as for orthopaedic practice. For example, serum or urine levels of pentosidine are now used to estimate future fracture risk in osteoporosis and diabetes. In our research, we demonstrated age-related changes in collagen cross-links in bone and abnormalities of cross-links in osteoporosis and diabetes.

Effects of alendronate on bone formation induced by recombinant human bone morphogenetic protein 2

Local alendronate administration could inhibit β -tricalcium phosphate (TCP) resorption or bone formation or both induced by recombinant human bone morphogenetic protein 2.

Bone formation and resorption was examined in patients after implantation of β -TCP blocks with 60% and 75% porosity in opening wedge high tibial osteotomy. The β -TCP was completely resorbed within 3.5 years.

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