English Lectures & Papers 12 "Osteoarthritis"

Feb. 4th (Sat) 9:50～10:50
Room 2 (Yamagata Terrsa 1F Terrsa Hall)

English Lectures 12 (L12-1)

Arthroscopic surgery with use of PC assistance for osteoarthritis of the elbow

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Osteoarthritis of the elbow is most often seen in heavy duty workers who overuse their upper extremities, in throwing athletes, or after traumatic injuries such as intra-articular fractures of the elbow. However, as the disease progresses, due to the anatomy of the elbow, which is originally externally bent, osteophyte formation mainly occurs in the humero-ulnar joint, which ensures stability as the axis of flexion and extension, and cartilage wear mainly occurs in the humero-radial joint, which is subject to compression shear forces. 1) Osteophytes of the humero-ulnar joint are originally intended for the purpose of protecting the joint, but since loose bodies and excessive osteophyte formation can cause pain and limited range of motion, it is desirable to identify the focus of lesion and resect it. 2) Although cartilage degeneration of the humero-radial joint is irreversible, debridement of the articular surface and subsequent unloading exercises can be expected to regenerate fibrocartilage and preserve the joint. The goal of joint preservation is possible.
To improve the function of the elbow without compromising its stability, it is necessary to perform 1) and 2) in a minimally invasive manner, and arthroscopic surgery is ideal for this purpose. In addition, preoperative simulation using dynamic 3D-CT and preoperative CAD modeling accordingly compensate for the weakness of arthroscopy, which is not good at providing a bird's-eye view. The compatibility of preoperative PC support with arthroscopic surgery is extremely good and effective. We will present our elbow arthroscopic surgery and PC-assistance with preoperative 3D simulation and CAD modeling.

【Curriculum Vitae】

1985 M.D. Osaka University, School of Medicine
1997 Ph.D. Osaka University, School of Medicine

Professional Career:
1985 Osaka University Hospital (Residency)
1986 Himeji Red Cross Hospital, Dept. of Orthopaedic Surgery
1988 Kagawa Medical University, Dept. of Orthopaedic Surgery
(1988-89 Humboldt University, Berlin, Germany, Prof. Zippel)
(1989 La Clinique de Longeraie, Lausanne, Switzerland, Prof. Narakas)
1991 Osaka Kosei-nenkin Hospital, Dept. of Orthopaedic Surgery
1997 Osaka University Medical School, Assistant Professor
2001 Rinku General Medical Center, Chief of Dept. of Orthopaedic Surgery
2007 Osaka Kosei-nenkin Hospital, Dept. of Orthopaedic Surgery, Chief of Upper Extremity Division
2012 JCHO Osaka Hospital, Director of Emergency / Sports Medicine
2020 JCHO Osaka Hospital, Executive Manager / Director of Orthopaedic Surgery (Clinical Professor of Osaka University)
2022 JCHO Osaka Hospital, Vice Director of Hospita

2021.2 Japan Elbow Society, President of the 33rd Annual Congress

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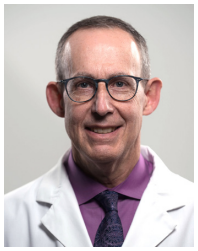
English Lectures 12 (L12-2)



Primary Osteoarthritis of the Elbow

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Primary osteoarthritis of the elbow is commonly associated with a history of heavy use and is typically more symptomatic in the dominant arm. It is more frequently seen in men than women. Patients present with stiffness, locking, end-range impingement pain and less commonly with an ulnar neuropathy. The pattern of osteophyte distribution is typical, blocking motion and often separating off and resulting in loose bodies. The cartilage of the ulnohumeral joint is usually well preserved while cartilage loss of the radiocapitellar joint is common. Unlike the documented experience in the knee, debridement of impinging osteophytes and removal of loose bodies, either open or arthroscopically, is highly effective at reducing pain and improving function in patients with primary osteoarthritis. In most cases radial head excision is not needed in spite of the loss of cartilage. In advanced cases ulnohumeral cartilage loss is seen, resulting in midarc pain which is less responsive to debridement arthroplasty. These patients may be better treated with total elbow arthroplasty.

【Curriculum Vitae】

Undergraduate Training:

1989 – 1991	University of Calgary Faculty of Medicine, Department of Graduate, MS
1978 – 1982	University of British Columbia, Faculty of Medicine, MD
1975 – 1979	University of British Columbia, Faculty of Science, BS

Surgical Research Training:

1991 – 1992	Visiting Clinician/Scientist, Orthopaedic Biomechanics Laboratory Dr. Bernard Morrey / Dr. Kai Nan An, Mayo Clinic, Rochester, Minnesota
1989 – 1991	Hand & Upper Extremity Fellowship, Dr. Robert Y. McMurtry Foothills Hospital, The University of Calgary, Calgary, Alberta
1989 – 1991	Basic Science Research Fellowship, Joint Injuries & Diseases Research Group, Dr. Cyril B. Frank The University of Calgary, Calgary, Alberta
1984 – 1989	Resident, Division of Orthopaedic Surgery University of Toronto, Toronto, Ontario
1984 – 1985	Orthopaedic Research Fellow Sunnybrook Medical Centre, University of Toronto, Toronto, Ontario
1982 – 1983	Rotating Intern, Misericordia Hospital University of Alberta, Edmonton, Alberta

Appointments:

2014 – present	Site Chief of Surgery, St. Joseph's Health Care London
2013 – present	Director, Roth|McFarlane Hand and Upper Limb Centre St. Joseph's Health Care London
2013 – present	Medical Director, Workplace Safety and Insurance Board Upper Limb Specialty Clinic, St. Joseph's Health Centre
1992 – present	Consultant, Roth|McFarlane Hand and Upper Limb Centre Division of Orthopaedic Surgery, St. Joseph's Health Centre, London, Ontario
1992 – present	Co-Director, Roth|McFarlane Hand and Upper Limb Centre Bioengineering Research Laboratory
2002 – present	Professor, Division or Orthopaedic Surgery, Department of Surgery, University of Western Ontario, London, Ontario

Total Presentations, Publications and Abstracts:
Presentations: 694; Peer Reviewed Papers: 315; Books: 3; Book Chapters: 93, Visiting Professor: 26

English Papers 12 "Osteoarthritis"

Feb. 4th (Sat) 10:50～11:05
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English Papers 12 (L12-3)

Changes in elbow joint contact area in symptomatic valgus instability of the elbow in baseball players

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Repetitive valgus stress to the elbow during throwing motions leads to not only medial ulnar collateral ligament (UCL) injury, but also medial olecranon fossa hypertrophy. Measurement of the joint contact patterns can determine the kinematics of the elbow joint in baseball pitchers with symptomatic valgus instability elbow. Our hypothesis is that the joint contact areas of elbows are changed more with elbow valgus stress in pitchers with symptomatic elbow valgus instability than without instability. The aim of this study was to evaluate the joint contact area of the dominant side and that of the non-dominant side without valgus instability in symptomatic pitchers. Ten symptomatic elbows medial ulnar collateral ligament (UCL) deficient baseball pitchers participated in this study. Computed tomography (CT) data from the dominant and non-dominant elbows were obtained with and without elbow valgus stress. The CT imaging data of each elbow joint were reconstructed using a 3D reconstruction software package, and the radiocapitellar and ulnohumeral joint contact areas were calculated. The center of the contact area and the translation from the position without stress the position with valgus stress were also calculated. With elbow valgus stress, the contact area changed, and the center of the radiocapitellar joint contact area translated signifcantly more laterally in the dominant elbow than in the non-dominant elbow ($p= 0.036$). In addition, the center of the ulnohumeral joint contact area translated significantly more posteriorly in the dominant elbow than in the non-dominant elbow ($p= 0.041$). These changes in contact areas could be the reason for cartilage injury at the posterior trochlea in pitchers with UCL deficiency.

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English Papers 12 (L12-4)

Arthroscopic Debridement of Elbow Osteoarthritis Using CT-Based Computer-Aided Navigation Systems Is Accurate

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[2]Department of Orthopaedic Surgery, Yukioka Hospital, Japan

Purpose: To evaluate whether the bony impingement lesion in elbow osteoarthritis can be removed accurately, as planned during arthroscopy, by using the computer-aided navigation system and performing mock surgery using 3-dimensional (3D)-printed bone models for clinical applications.

Methods: We performed mock surgery using 3D-printed plaster bone models of the humerus of 15 actual patients with elbow osteoarthritis. Two types of experiments were conducted to evaluate the surgical accuracy. Three surgeons performed the mock surgery, each with 15 bone models (total, 45 trials). Surgical accuracy was based on the mean of 45 trials. The differences in surgical accuracy among the 3 surgeons were also evaluated (mean 15 trials). The same surgeon performed 30 trials, and the difference in surgical accuracy between the first and the second halves was also evaluated (mean 15 trials).

Results: The spatial error in the entire elbow joint was 1.13 mm. In terms of resection volume, a mean of 8% more volume was resected than was planned, and 85% of the planned area was resected. In our experiments, the surgical accuracy was significantly lower in the anterior than in the posterior joint. Intrarater reliability was intraclass correlation (ICC)2,1 0.81 and inter-rater reliability was ICC1,1 0.87.

Conclusions: Surgery using computer-aided navigation systems for arthroscopic debridement of the elbow provided accuracy comparable to that in other joints.

Clinical relevance: Arthroscopic debridement of elbow osteoarthritis requires advanced surgical skills because accurate identification of the bony impingement legion is difficult during surgery. Surgery using computer-aided navigation systems for arthroscopic debridement of the elbow will provide real-time tracking of both the surgical instruments and bony impingement lesions as well as solve the technical difficulties of arthroscopic surgery of the elbow joint.