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N. Matsui, Y. Taneda, Y. Yoshida (Eds.)

Arthroplasty 2000

Recent Advances in Total Joint Replacement

With 165 Figures, Including 13 in Color

Springer

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ISBN-13: 978-4-431-68429-9 e-ISBN-13: 978-4-431-68427-5

DOI: 10.1007/978-4-431-68427-5

Library of Congress Cataloging-in-Publication Data

Arthroplasty 2000 : recent advances in total joint replacement / N. Matsui, Y. Taneda, Y. Yoshida (eds.).

p. ; cm.

Includes bibliographical references and index.

1. Total hip replacement—Congresses. 2. Arthroplasty—Congresses. 3. Hip joint—Surgery—Congresses. 4. Knee—Surgery—Congresses. 5. Total knee replacement—Congresses. I. Title: Recent advances in total joint replacement. II. Title: Total joint replacement. III. Matsui, Nobuo. IV. Taneda, Y. (Yoichi), 1949– V. Yoshida, Yukio.

[DNLM: 1. Arthroplasty, Replacement, Hip. 2. Arthroplasty, Replacement, Knee. 3.

Hip Prosthesis. 4. Knee Prosthesis. WE 855 A787 2001]

RD549 .A745 2001

617.5'810592—dc21

2001020427

Printed on acid-free paper

© Springer-Verlag Tokyo 2001

Softcover reprint of the hardcover 1st edition 2001

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Typesetting, printing, and binding: Best-set Typesetter Ltd., Hong Kong

SPIN: 10784680

Preface

Several million people in the United States have received total joint arthroplasties for osteoarthritis, rheumatoid arthritis, or other joint diseases in the past 30 years. About 100 000 patients in Japan and 350 000 patients in the United States undergo joint replacement surgery every year. Of these patients, 98% are freed from pain and disability and obtain good quality of life after surgery. In the 21st century, about 30% of the population will be over 65 years old, and osteoarthritis will be one of the major problems in the orthopedic field. More and more reconstructive surgery will be necessary to relieve joint disability.

In 1938, Phillip Wiles in Britain developed the first total hip arthroplasty (THA), but poor-quality material resulted in low durability. In 1963, John Charnley, also in Britain, developed the epoch-making low-friction hip joint using high-density polyethylene and bone cement, thereby prolonging the survival of artificial joints by approximately 20 years. In the past 40 years, total joint arthroplasty has made remarkable progress thanks to new knowledge of materials for artificial joints based on biomechanics, and on surgical experience and improved technique.

The development of total knee arthroplasty (TKA) has lagged slightly behind that of total hip arthroplasty, but nowadays good clinical outcomes have been reported from many facilities. Forty years have passed since Charnley's development of THA, but longevity of the artificial joint is a goal that has not yet been totally attained, regardless of the improvement of quality control in new materials.

Friction wear of polyethylene in the artificial joint cannot be avoided. Small polyethylene particles within 10 microns are caught by macrophages, which release inflammatory mediators such as cytokines and proteases, leading to osteolysis and causing loosening of artificial joints. However, ultra-high molecular weight polyethylene (UHMWPE) strengthened by gamma irradiation under oxygen-free conditions has been developed and used effectively.

Recently, combinations of ceramic or zirconia heads for UHMWPE acetabular components and metal-on-metal or ceramic-on-ceramic THA have been developed to address the problem of polyethylene wear particles that lead to bone absorption around artificial joints and subsequent loosening. Further studies in these fields are expected.

This book deals with recent developments in total joint arthroplasty, as reported at the 30th annual meeting of the Japanese Society for Replacement Arthroplasty held

February 8–11, 2000, in Nagoya, Japan. At that meeting, guest speakers from many overseas countries and specialists of total joint arthroplasty in Japan presented papers that focused on the following topics: problems of wear and loosening, revision THA and TKA, metal-on-metal and ceramic-on-ceramic interfaces for THA, posterior cruciate ligament retention or resection in TKA, and TKA for Charcot joint. Papers on these as well as such current topics as cross-linked UHMWPE, custom hip prostheses, and computer-assisted surgery in THA are collected in this volume to provide up-to-date information and knowledge on joint arthroplasty surgery that will be valuable to all orthopedic surgeons.

Nobuo Matsui

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