

# Recent Trends in Orthopedic Surgery Aiming to Improve Quality of Life for Those with Rheumatoid Arthritis: Data from a Large Observational Cohort

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**ABSTRACT. Objective.** To describe current trends in the numbers of rheumatoid arthritis (RA)-related surgeries.

**Methods.** The number of operations was determined for patients with RA in a large observational cohort [Institute of Rheumatology, Rheumatoid Arthritis (IORRA)] enrolled from 2001 to 2012.

**Results.** The total number of operations peaked in 2002 and gradually decreased thereafter, but began to increase again in 2008. The number of total knee replacements has decreased since 2003, while the number of wrist and foot arthroplasties and the number of artificial finger prosthesis surgeries have increased gradually.

**Conclusion.** Our results suggest that the number of orthopedic surgeries may change in response to changes in the drug therapy for RA. (J Rheumatol First Release April 1 2014; doi:10.3899/jrheum.131018)

*Key Indexing Terms:*

BIOLOGICS

ORTHOPEDIC JOINT SURGERY

DISEASE-MODIFYING ANTIRHEUMATIC DRUGS

RHEUMATOID ARTHRITIS

Rheumatoid arthritis (RA) is an immune-mediated process involving the joints and is associated with marked functional disability. In recent years, disease-modifying antirheumatic drugs (DMARD) have been used to inhibit or halt the underlying immune process and prevent longterm damage. Moreover, biological DMARD have increased the number of treatment options.

However, sustained RA remission is actually uncommon in daily clinical practice<sup>1</sup>. Despite the availability of such aggressive therapies, ongoing progressive destruction of joints occurs in a subgroup of patients with RA, and they eventually require joint surgery<sup>2</sup>. Therefore, orthopedic procedures, including joint replacement surgeries, are still needed to improve the overall function and quality of life of these patients.

We previously investigated whether or not the number of orthopedic operations, including total joint replacements

(TJR), had decreased among Japanese outpatients in a single institute-based large observational cohort [Institute of Rheumatology, Rheumatoid Arthritis (IORRA)]<sup>3</sup>. We reported that the total number of operations has been declining since 2002. The number of TJR, such as total knee replacement (TKR) and total hip replacement (THR), peaked in 2003 and since then has been gradually decreasing. These decreases may be related to the use of methotrexate (MTX) and biological DMARD therapy. The use of MTX for the treatment of RA was approved by the Japanese Ministry of Health, Labor, and Welfare in 1999. Moreover, the use of infliximab as the first biologic DMARD was approved in 2003, and the use and dosage of MTX and the rate of use of biological agents have been increasing every year.

At present there are 7 biological DMARD and new nonbiological DMARD such as tacrolimus, iguratimod, and tofacitinib that can be prescribed in Japan. Therefore, our aim was to determine whether these new medical treatments have affected RA-related orthopedic surgery rates. In this study, we analyzed recent trends in orthopedic surgery.

## MATERIALS AND METHODS

The IORRA cohort was established in October 2000 as a single institution-based large observational cohort of Japanese patients with RA, and the IORRA cohort study was conducted at the Institute of Rheumatology, Tokyo Women's Medical University<sup>4</sup>. All of the participants were diagnosed with RA according to the 1987 classification criteria for RA by the American College of Rheumatology<sup>5</sup> and were surveyed biannually (in April and October). In principle, we enrolled all of the patients in this

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IORRA cohort who had visited our institution; only 2% refused to participate. Between 5000 and 6000 patients were involved in each phase of the survey and > 98% submitted completed questionnaires by mail. The number of patients in the IORRA cohort was equivalent to about 1% of all Japanese patients with RA (estimated number > 700,000). Moreover, according to the Japanese Ministry of Health, Labor, and Welfare and the Diagnosis Procedure Combination database, the number of RA-related operations performed in our institute was the highest for any institution in Japan from July 2010 to March 2011.

We calculated the semiannual number of operations performed per 1000 outpatients with RA from April 2001 to October 2012.

## RESULTS

Figure 1 shows the changes in drugs taken and disease activity from 2000 to 2012. Figure 1A indicates the changes in drugs taken by patients with RA in the IORRA cohort from 2000 to 2012, and Figure 1B shows the changes in disease activity in RA patients. Disease activity was assessed using the Simplified Disease Activity Index (SDAI). As the use of steroids and nonsteroidal antiinflammatory drugs decreased and the use of MTX and biologics

increased (Figure 1A), the number of patients in remission (assessed by SDAI) has increased dramatically (Figure 1B). The average dose of MTX has also increased and these changes should lead to better patient outcomes.

Figure 2 shows the semiannual number of RA-associated operations for the years 2001 to 2012. This number peaked in autumn 2002 (31.8/1000 outpatients with RA), then decreased through 2007 (15.4/1000 outpatients with RA), but only gradually began to increase since 2008 (21.2/1000 outpatients with RA in spring 2012).

Similarly, the number of prosthetic joint replacements has gradually decreased since 2003, but began to stabilize around 2008 (Figure 2). The most commonly performed prosthetic joint replacement operation over the entire period was TKR (Figure 3A). However, the rates of prosthetic joint replacement surgeries have changed dramatically over time (Figure 3A). The number of TKR has gradually decreased since 2003, while the number of total elbow replacements (TER), total ankle replacements (TAR), and

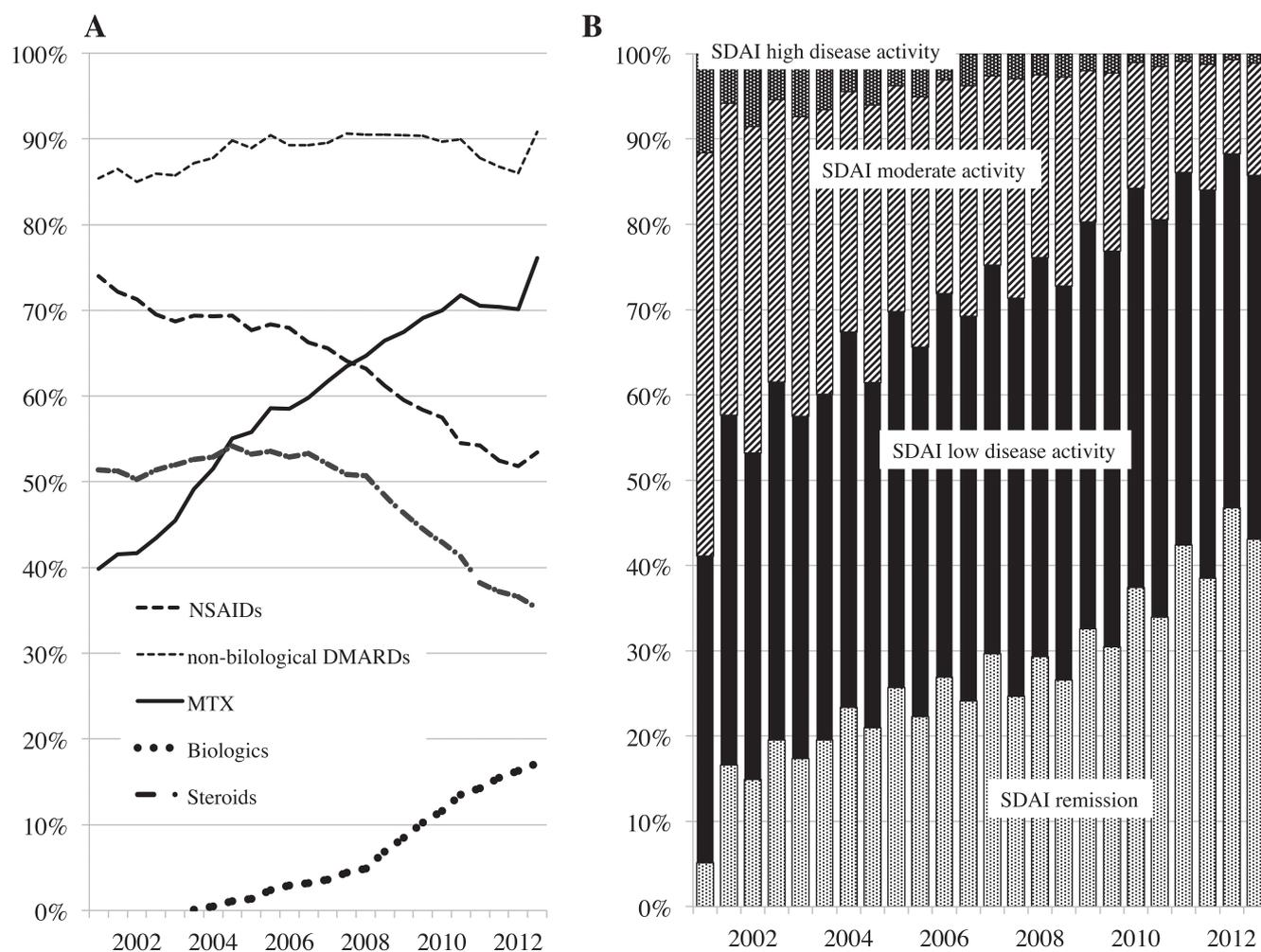


Figure 1. Changes in (A) drug use and (B) disease activity [as assessed by the Simplified Disease Activity Index (SDAI)] in patients with rheumatoid arthritis (RA) in the IORRA cohort from 2000 to 2012. NSAID: nonsteroidal antiinflammatory drugs; DMARD: disease-modifying antirheumatic drugs; MTX: methotrexate.

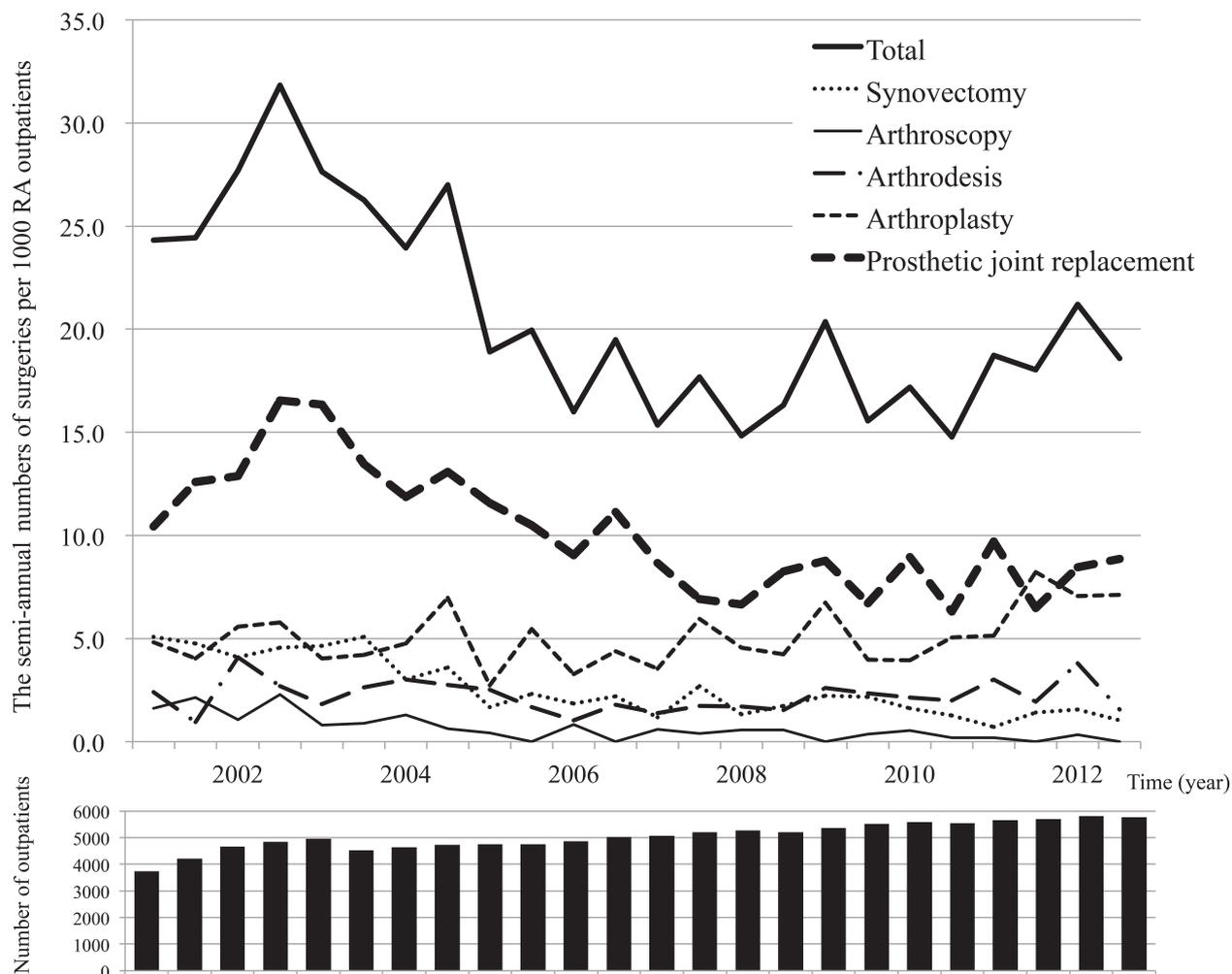


Figure 2. The semiannual numbers of surgeries performed per 1000 outpatients with rheumatoid arthritis (RA) participating in a single institute-based large observational cohort (IORRA) study.

artificial finger prosthesis operations has gradually increased, especially since 2008. Although arthroplasties have gradually increased in number, arthroscopic surgeries and synovectomies have gradually decreased (Figure 2). The arthroplasties included wrist arthroplasty, such as the Sauvé-Kapandji procedure; procedures for correcting boutonniere deformity and swan-neck deformity; and foot arthroplasties (i.e., correction of forefoot deformity using metatarsal head resection or metatarsophalangeal joint-preserving surgery)<sup>6</sup>.

Figure 3B shows the changes in the semiannual numbers of surgeries based on surgical site per 1000 outpatients with RA. The number of surgeries at the knee joint has been decreasing since 2002, and the knee joint surgeries were mainly arthroscopic synovectomies and TKR during the period 2001–2006 and TKR during the period 2007–2012. Otherwise, surgeries involving fingers, wrists, feet, and ankles have dramatically increased in number, and those procedures were mainly arthroplasties as described above.

## DISCUSSION

Several studies from different countries indicate that the rates of orthopedic surgery in patients with RA have decreased in recent years. Improvements in medical treatment may partly explain the reduction in numbers of orthopedic joint surgeries, which also suggests a worldwide trend toward improved longterm outcomes.

There was a decrease in RA-related surgical procedures involving the lower limb between 1987 and 2001 in Scandinavian countries<sup>7</sup>, and in RA-related surgeries of the upper limb between 1998 and 2004 in Swedish patients<sup>8</sup>. There was a decrease in the incidence of THR for RA reported from Denmark<sup>9</sup>, and the incidence of TJR and synovectomies decreased in the Norwegian population from 1994 to 2004<sup>10</sup>. Sokka, *et al* reported that the rate of TJR in central Finland increased from 2-fold to 10-fold in patients without RA between 1986 and 2003, but did not increase in patients with RA<sup>11</sup>. They reported that the rates of THR and TKR were virtually unchanged over this period in patients with RA. These observations are consistent with other

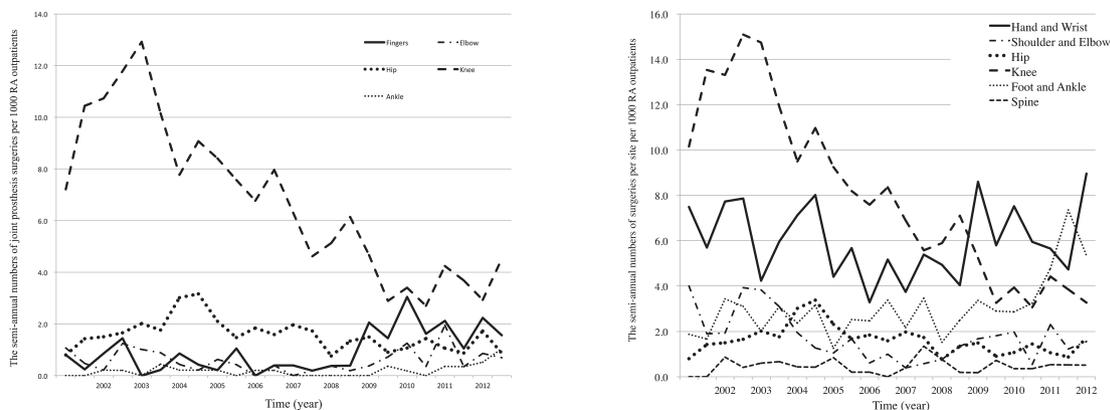


Figure 3. (A) The semiannual numbers of joint prosthesis surgeries performed per 1000 outpatients with rheumatoid arthritis (RA) participating in the IORRA cohort study. (B) The semiannual numbers of surgeries site of operation per 1000 outpatients with RA participating in the IORRA cohort study.

reports, indicating an increase in rates of TKR and THR surgeries over the past 2 decades in the general population of many countries, with a concomitant decrease in TJR in patients with RA<sup>12</sup>.

The California State Hospitalization Database for 1983–2001 has shown that, after peaking in the mid-1990s, the rate of TKR in patients with RA declined during 1998–2001<sup>13</sup>. Moreover, Louie and Ward examined TKR rates through 2007 and investigated whether rates of THR and ankle or wrist surgery among patients with RA decreased between 1983 and 2007 in California<sup>14</sup>. Nationwide Inpatient Sample database information from 1992 through 2005 in the United States revealed that the number of primary TJR procedures increased in the general and RA populations but, after adjusting for population growth, age, and sex, the rate was significantly lower in patients with RA<sup>15</sup>.

These reports indicate that improvements in medical treatment may partly explain the reduction in rates of RA-related orthopedic joint surgery, and also indicate that longterm outcomes for RA have been improving in Europe and the United States. However, these studies were published some time ago. Therefore, we did our study to provide accurate, more up-to-date information about the rates of RA-related operations.

In our study, the total number of operations decreased gradually during the period 2001–2007, but increased little by little during the period 2008–2012. Concerning TJR, the number of TKR decreased gradually, while the number of TER, TAR, and artificial finger prosthesis surgeries increased, especially beginning in 2008. This is because some newly designed TER and TAR have become available for Japanese patients. Moreover, the numbers of wrist and artificial finger arthroplasties have especially increased. Currently, disease activity can be successfully controlled in many patients with RA. Consequently, the disease duration in those patients who underwent joint surgeries between

2003 and 2009 is prolonged<sup>16</sup>. However, drug therapy cannot perfectly suppress disease activity, and many patients develop RA before receiving treatment with biological DMARD. The recent trend in rates of operative procedures may be a reflection of reduced disease activity in patients with longstanding RA who now desire a much better quality of life. With the trend toward milder disease because of improved medical treatment, we speculate that patients with RA may want and seek better function as measured by the activities of daily living. This may also explain the trend toward increased rate of foot arthroplasties.

The decision to undergo surgical intervention naturally depends on a consensus of the patient, orthopedic surgeon, and rheumatologist, and the clinical results for patients with RA depend on the quality of the surgical technique. Therefore, we think that orthopedic surgeries will change in response to changes in drug therapy for RA. Even now, there is a real need to improve quality of life, especially in patients with established RA treated medically and surgically.

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