Postoperative Surgical Infection After Spinal Surgery in Rheumatoid Arthritis

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Abstract

Individuals with rheumatoid arthritis are at higher risk for infection than the general population, and surgical site infection after spinal surgery in this population can result in clinically significant complications. The goal of this study was to identify risk factors for acute surgical site infection after spinal surgery in patients with rheumatoid arthritis who were treated with nonbiologic (conventional) disease-modifying antirheumatic drugs (DMARDs) alone or with biologic DMARDs. All patients treated with biologic agents were treated with nonbiologic agents as well. The authors performed a retrospective, single-center review of 47 consecutive patients with rheumatoid arthritis who underwent spinal surgery and had follow-up of 3 months or longer. The incidence of surgical site infection was examined, and multivariate logistic regression analysis was performed to test the association of surgical site infection with putative risk factors, including the use of biologic agents, methotrexate, and prednisolone, as well as the duration of rheumatoid arthritis, the presence of diabetes, patient age, length of surgery, and number of operative levels. After spinal surgery, 14.89% (7 of 47) of patients had surgical site infection. Use of methotrexate and/or prednisolone, patient age, diabetes, duration of rheumatoid arthritis, length of surgery, number of operative levels, and use of biologic DMARDs did not significantly increase the risk of infection associated with spinal surgery. All patients who had surgical site infection had undergone spinal surgery with instrumentation. The findings show that greater attention to preventing surgical site infection may be needed in patients with rheumatoid arthritis who undergo spinal surgery with instrumentation. The authors’ knowledge, this is the first study to show that the use of biologic agents did not increase the incidence of surgical site infection after spinal surgery in patients with rheumatoid arthritis. [Orthopedics. 2016; 39(3):e430-e433.]

Postoperative infection is one of the most common causes of increased morbidity, mortality, and hospital costs after orthopedic procedures. Surgical site infection is relatively common after spinal surgery compared with procedures for artificial joint replacement, and numerous studies have shown an incidence of 1% to 10.9%. Because patients with rheumatoid arthritis have a higher risk of infection compared with the general population, examination of the risk factors for surgical site infection in patients with rheumatoid arthritis after spinal surgery is of great clinical significance.

The relationship between the risk of surgical site infection and perioperative use of biologic agents has been studied recently; however, the findings are conflicting. In the field of spinal surgery, recent case reports indicated that the use of biologic agents may increase the risk of postoperative infection, even though their administration may be interrupted before surgery. In contrast, few clinical data are available on the influence of rheumatoid arthritis, including disease activity, the use of biologic agents, and the duration of surgery.
tion of disease, on postoperative infections, such as surgical site infection and delayed wound healing, in patients with rheumatoid arthritis after spinal surgery.

To evaluate the effect of perioperative use of biologic agents on the risk of surgical site infection after spinal surgery, the authors reviewed the medical records of 47 patients who had rheumatoid arthritis and underwent spinal surgery.

**MATERIALS AND METHODS**

**Patients**

This study was a retrospective, single-center review of the records of patients with rheumatoid arthritis who underwent spinal surgery and were treated with either nonbiologic (conventional) disease-modifying antirheumatic drugs (DMARDs) alone or with biologic DMARDs. Between 2011 and 2014, a total of 47 consecutive patients with rheumatoid arthritis who underwent cervical or lumbar spinal surgery were followed for at least 3 months after surgery (Table 1). Of these patients, 11 were treated with biologic agents, including infliximab (n=4), tocilizumab (n=3), adalimumab (n=1), golimumab (n=1), and etanercept (n=2). The remaining 36 patients were treated with nonbiologic DMARDs alone. A standard antibiotic (cefazolin 1 g) was given intravenously one time before surgery and once 1 to 2 hours after the completion of surgery. Two days after surgery, prophylactic antibiotics were used regularly, twice a day. The incidence of surgical site infection in both groups was examined. Infection was identified when the surgeons at the study institute diagnosed or suspected surgical site infection, as defined by the Guideline for Prevention of Surgical Site Infection, 1999.12

As a rule, treatment with nonbiologic DMARDs was continued perioperatively, but these agents were administered cautiously in individual cases if patients had comorbidities or were elderly. The biologic DMARDs were withdrawn preoperatively, with the withdrawal period determined according to the guidelines established by the Japan College of Rheumatology.12

**Statistical Analysis**

Collected data were sorted, coded, and entered into an Excel spreadsheet (Microsoft Corp, Redmond, Washington) for analysis with GraphPad Prism for Windows, version 6.0 (GraphPad Software, San Diego, California). Baseline characteristics of the patients in both groups were compared with the Mann-Whitney U test for continuous variables and the chi-square test for categorical variables (Table 2). Multivariate logistic regression analysis was performed with R software, version 2.15, to test the association of surgical site infection, such as dose of methotrexate, dose of prednisolone, diabetes, duration of rheumatoid arthritis, instrumentation, and length of surgery (Table 2).

Overall, 7 (14.9%) cases of postoperative surgical site infection were identified in the 2 groups of patients. These included 2 (4.3%) superficial incisional surgical site infections for which antibiotics were required and 5 (10.6%) organ or space surgical site infections that required surgical treatment. Among patients receiving biologic agents, 1 (9.1%) surgical site infection occurred. Among patients receiving nonbiologic agents, 6 (16.7%) surgical site infections occurred. One case of surgical site infection was observed among the patients receiving biologic agents, and 6 cases were observed among the patients not receiving biologic agents, but this difference was not statistically significant [odds ratio, 2.00 (95% confidence interval, 0.21-18.7), P=1.00; Fisher’s exact test]. Regarding instrumentation used, there was also no statistically significant difference [odds ratio, 2.29 (95% confidence interval, 0.24-22.1), P=1.00; Fisher’s exact test].

### Table 1

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Biologic Agents (n=11)</th>
<th>Nonbiologic Agents (n=36)</th>
<th>No. of Cases of Surgical Site Infection (n=7)</th>
<th>Infection Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical laminoplasty</td>
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<tr>
<td>Posterior cervical fusion</td>
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<td>Lumbar laminectomy</td>
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<tr>
<td>Posterolateral fusion</td>
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<td>16.7%</td>
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<td>Posterior lumbar interbody fusion</td>
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<tr>
<td>Anteroposterior combined surgery</td>
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<td>2</td>
<td>2</td>
<td>100%</td>
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</table>

**RESULTS**

Mean patient age was 62.6 years (range, 34–78 years) in the group receiving biologic agents and 71.9 years (range, 47–83 years) in the group receiving nonbiologic agents. No significant difference was found between the 2 groups in pre- and perioperative risk factors for surgical site infection, such as dose of methotrexate, dose of prednisolone, diabetes, duration of rheumatoid arthritis, instrumentation, and length of surgery (Table 2).
Risk factors for surgical site infection were examined with multiple logistic regression analysis. The findings showed that the use of biologic agents, methotrexate, and prednisolone as well as patient age, the presence of diabetes, duration of rheumatoid arthritis, length of surgery, and number of operative levels did not significantly increase the risk of infection (Table 3). No statistically significant differences were noted in odds ratio for the incidence of surgical site infection [odds ratio, 1.888 (95% confidence interval, 0.08-7.72), P=.688] between the 2 groups (Table 3).

**DISCUSSION**

Infection can be a devastating complication of spinal surgery because it may lead to excess morbidity and poor patient outcomes. Numerous studies have reported the influence of perioperative risk factors after spinal surgery. However, surgical wound infections are among the most common complications after spinal surgery. Previous reports have identified that the spinal parameters of combined anterior and posterior spinal fusion, multiple levels of surgery, instrumentation used, and longer operative time were predictive of postoperative surgical site infection. The current results also showed that patients who underwent combined anterior and posterior spinal fusion had a significantly higher risk of surgical site infection (Table 1).

Patients with rheumatoid arthritis are at higher risk for postoperative surgical site infection after artificial joint replacement. In contrast, the influence of rheumatoid arthritis on the development of surgical site infection after spinal surgery is largely unknown. Postoperative surgical site infection rates for spinal surgery ranged from 1% to 10.9% in a recent systematic review. Hirano et al showed that surgical site infection occurred in 14.3% of patients with rheumatoid arthritis who underwent occipitothoracic fusion for severe destructive cervical lesions. This was a relatively higher incidence than that in patients without rheumatoid arthritis. In accordance with the findings of Hirano et al, in the current study, postoperative surgical site infection occurred in 14.9% (7 of 47) of patients with rheumatoid arthritis after spinal surgery. The high risk of infection in patients with rheumatoid arthritis may be associated with both severity of disease and exposure to medication.

Numerous studies have reported the influence of biologic agents on surgical site infection in patients with rheumatoid arthritis. However, their influence is still controversial. This study was performed to add to the understanding of risk factors for surgical site infection after spinal surgery in patients with rheumatoid arthritis. The findings showed that patients with rheumatoid arthritis who underwent spinal surgery and were treated with biologic agents according to a regimen with adequate drug holidays.
may not have a significantly increased risk of surgical site infection compared with patients with rheumatoid arthritis who were treated with nonbiologic DMARDs.\textsuperscript{1,2}

Although some studies found a statistically significant association between the use of instrumentation and postoperative surgical site infection, others did not report this association.\textsuperscript{14,18} Therefore, a systematic review could not confirm a positive or negative association.\textsuperscript{2} In contrast, in the current study, all patients who had surgical site infection had undergone spinal surgery with instrumentation (Table 1). The indications for spinal instrumentation in patients with rheumatoid arthritis were recently expanded. The current findings showed that greater attention to surgical site infection may be needed when performing spinal surgery with instrumentation in patients with rheumatoid arthritis compared with patients without rheumatoid arthritis.

Risk factors for postoperative surgical site infection after spinal surgery are multifactorial and involve a complex interplay of patient and procedural influences. This study was limited by the inclusion of multifold spinal procedures that could affect the risk of surgical site infection. Further studies of postoperative infection in patients with rheumatoid arthritis are needed. The number of patients in this study was small, and the study was performed at a single center. However, to the authors’ knowledge, this is the first study to find that biologic agents did not increase the incidence of surgical site infection after spinal surgery in patients with rheumatoid arthritis.

REFERENCES