

Research Articles

Reoperation and Readmission Rates in Rheumatoid Arthritis versus Osteoarthritis following Thumb Basal Joint Arthroplasty: A Retrospective Comparative Analysis

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Objectives

Arthritis of the first carpometacarpal joint can often necessitate surgical intervention in the form of a thumb basal joint arthroplasty (BJA). Post-operative outcomes may be affected by the type of underlying arthritis, particularly rheumatoid arthritis (RA) vs. osteoarthritis (OA). To better inform shared decision-making, this study aimed to compare reoperation and readmission rates following thumb BJA surgery in RA vs. OA.

Methods

Cohorts were developed by retrospectively identifying patients with first carpometacarpal arthritis secondary to RA or OA who were treated with BJA using the TriNetX Research Database. Propensity score matching was implemented to adjust for preoperative risk differences. Cohorts were evaluated for primary outcomes of reoperation and readmission rates at 12 months. Measures of association, such as risk ratios and 95% confidence intervals, were used to compare RA against OA primary outcomes.

Results

After matching, 2,064 patients aged 65 to 90 years old were included. RA patients were significantly more likely to have reoperation by revision BJA at 12 months (RR = 2.3, P value 0.002). No significant difference was noted in reoperation rates due to implant removal between RA and OA (RR = 1.2, P value = 0.8). RA patients were significantly more likely to experience readmission at 12 months (RR = 1.5, P value 0.008). RA patients were also significantly more likely to experience systemic complications within 12 months, such as acute kidney failure, pneumonia, and urinary tract infection.

Conclusion

Following BJA, patients with RA have a higher incidence of reoperation at 12 months than those with OA. Patients with RA are more likely to experience readmission postoperatively as well as systemic complications. A deeper understanding of outcomes, such as reoperation rates, can help inform patient-physician shared decision-making.

INTRODUCTION

Arthritis of the thumb basal joint, also known as the carpometacarpal joint, is the second most common location in the hand for osteoarthritis (OA) after the distal interphalangeal joints.^{1,2} Basal joint arthritis mainly affects women

over 50 years of age, and literature estimates 20% of affected individuals will require some form of treatment within their lifetime.^{1,3,4}

Surgical treatment with basal joint arthroplasty (BJA) is often used to manage symptomatic basal joint arthritis. BJA can represent a variety of surgical procedures, each of

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which includes the removal of the trapezium bone.⁵ OA and rheumatoid arthritis (RA) can both affect the thumb basal joint⁶; however, surgical outcomes may not be equivalent.

BJA is more commonly employed following symptomatic basal joint arthritis secondary to OA than following inflammatory arthropathies like RA.^{7,8} Importantly, the systemic effects of RA could influence outcomes. Certain comorbidities, such as cardiovascular disease and venous thromboembolism, are increased in RA, which can heighten perioperative medical risks.⁹ Systemic corticosteroid use in the management of RA increases overall infection risk, and chronic users of at least 30 days preoperatively can have wound complication rates increased two to five times more than those who do not take corticosteroids.^{10,11} RA can also exaggerate surgical complexity via severe end-stage joint deformities, bone loss, and soft tissue laxity.¹²

Although patients with OA and RA can both develop basal joint arthritis, the underlying provoking pathologies differ, which may impact surgical outcomes. This study aims to compare the reoperation and readmission rates following BJA in patients with RA vs. OA. The authors hypothesized that BJA performed in the setting of RA would result in greater reoperation and readmission rates than in OA.

METHODS

The TriNetX database was used on February 19th, 2026, to identify patients with RA or OA who underwent BJA retrospectively. TriNetX is a research platform that stems from a global collaborative effort to generate real-world data by partnering with 120-plus healthcare organizations, encompassing 275 million patients worldwide.¹³ Click or tap here to enter text. TriNetX provides data on patient demographics, laboratory values, medications, diagnoses, and procedures. The patient information on the platform is deidentified, and the national database is HIPAA-compliant; therefore, the study was exempt from institutional review board approval.

Patients were divided into two cohorts based on a Current Procedural Terminology (CPT) code paired with International Classification of Diseases, 10th edition (ICD-10) codes. To be included in a cohort, the index event had to have occurred within the past twenty years. The first cohort represented RA patients diagnosed with RA of the left or right hand who underwent BJA, as defined by ICD-10 codes M06, M05, M05.841, M05.842, and CPT code 25447. A related group was created that excluded patients diagnosed with RA in the opposite hand who underwent a BJA within 1 year of the index event. The second cohort defined patients diagnosed with OA of the first carpometacarpal joint in the left or right hand who underwent BJA. A related group was created that excluded patients diagnosed with OA of the first carpometacarpal joint in the opposite hand who underwent a BJA within 1 year of the index event. Each CPT and ICD-10 code used included a filter to ensure patients were aged 65 to 90 years.

The primary outcomes assessed between cohorts were reoperation rates, defined as the number of specific procedures performed after the index surgery within a 12-month

window. When comparing RA vs. OA patients undergoing BJA, the CPT codes used to define the outcome of reoperation were removal of implant (20680) and revision BJA (25447). To define readmissions, a proprietary CPT code (1013659) within the TriNetX platform was used. All outcomes assessed were analyzed within a time window from 7 days post-index surgery to 12 months.

For all cohort comparisons, propensity score matching was used to adjust for preoperative risk differences, including age, sex, race, essential (primary) hypertension, heart failure, chronic obstructive pulmonary disease, chronic kidney disease, anemia, diabetes mellitus, obesity, and nicotine dependence. The propensity score was calculated for each patient using a logistic regression model, and the two cohorts were then 1:1 matched.

Statistical analysis was performed using the TriNetX platform, with the exception of total incidence statistics, which were performed in Excel. In the statistical analysis, measures of association were used to compare the risk of experiencing the outcome of interest. The difference in risk was estimated using a 95% confidence interval to assess whether it differed between cohorts. A difference was considered statistically significant at $P < 0.05$.

RESULTS

A total of 2,064 patients aged 65 to 90 years old were analyzed following propensity score matching. When comparing RA vs. OA cohorts, significant differences were noted for age, sex, race, essential hypertension, diabetes mellitus, chronic obstructive pulmonary disorder, overweight and obesity, anemia, heart failure, nicotine dependence, and chronic kidney disease [Table 1].

Within 12 months following BJA, RA patients were 80% (relative risk [RR], 1.8; 95% confidence interval [CI], 1.19-2.82; P value = 0.004) more likely than OA patients to undergo reoperation when accounting for both implant removal and BJA revision [Table 2]. The total incidence of reoperation at 12 months in the RA and OA cohorts was 5.5% and 3.0%, respectively. More specifically, RA patients were 2.3 times more likely to undergo reoperation when only reoperations due to BJA revision were considered ([RR], 2.3; 95% [CI], 1.33-3.86; P value = 0.002). No significant statistical differences were observed between the two cohorts when analyzing reoperation due to implant removal ([RR], 1.2; 95% [CI], 0.55-2.59; P value = 0.8).

Twelve months following BJA, RA patients were 50 percent more likely to be readmitted than patients with OA ([RR], 1.5; 95% [CI], 1.10-1.95; P value = 0.008) [Table 3]. Patients in the RA cohort were significantly more likely to experience systemic complications such as acute kidney failure ([RR], 1.8; 95% [CI], 1.04-2.99; P value = 0.03), pneumonia ([RR], 1.8; 95% [CI], 1.06-2.97; P value = 0.02), and UTI ([RR], 1.4; 95% [CI], 1.02-1.97; P value = 0.03) at 12 months. No statistically significant differences in systemic complications were observed in the remaining outcomes between the RA and OA cohorts within 12 months postoperatively.

Table 1. Patient demographics and comorbid characteristics of non-matched and matched RA-OA patients.

Characteristic	Non-matched patient			Matched patient		
	RA	OA	P value	RA	OA	P value
Total	1,043	3,729		1,032	1,032	
Patient Demographics						
Age at index	71.6 ± 4.8	71.1 ± 4.8	0.002	71.6 ± 4.8	71.5 ± 4.8	0.829
Female sex (%)	81.2	70.1	< 0.0001	81.1	81.2	0.955
Male sex (%)	18.8	29.9	< 0.0001	18.9	18.8	0.955
Race (%)						
White	88.4	91.1	0.007	88.8	89.8	0.434
Comorbidity (%)						
Essential Hypertension	65.8	56.0	< 0.0001	65.6	65.9	0.889
Diabetes Mellitus	24.3	20.8	0.01	23.8	23.6	0.918
Nicotine dependence	11.2	7.8	0.0005	10.9	10.6	0.831
COPD	17.7	10.3	< 0.0001	17.2	17.4	0.907
Overweight and Obesity	26.9	23.0	0.008	26.8	26.5	0.881
Anemia	22.8	13.2	< 0.0001	22.3	21.7	0.749
Heart failure	6.7	4.1	0.0004	6.3	5.5	0.455
Chronic Kidney Disease	17.2	10.6	< 0.0001	16.8	18.1	0.416

Table 2. Reoperation rates in RA vs. OA matched patients.

Reoperation	RA n = 1,032	OA n = 1,032	RR, CI	P value
	Incidence (%)			
7 days - 12 months post index surgery				
Removal of implant, deep (e.g. buried wire, pin, screw, metal band, nail, rod, or plate) - CPT 20680	14, (1.4%)	12, (1.2%)	1.2, (0.55-2.59)	0.8
Arthroplasty, interposition, intercarpal or carpometacarpal joints (BJA) - CPT 25447	43, (4.2%)	19, (1.8%)	2.3, (1.33-3.86)	0.002
Total incidence	57 (5.5%)	31 (3.0%)	1.8, (1.19-2.82)	0.004

* To protect patient privacy, numbers are rounded up to 10. This may impact results, particularly for small cohorts and infrequent outcomes.

DISCUSSION

Thumb basal joint arthritis can be treated surgically in both OA and RA patients; however, surgical outcomes may not be equivalent. To assess the reoperation and readmission rates following BJA, patients aged 65 to 90 years in the TriNetX database were retrospectively reviewed. The study hypothesis was upheld: patients with RA were significantly more likely than those with OA to undergo reoperation for implant removal and revision of the index BJA, or revision of the index BJA alone, within 12 months. Accordingly, the cumulative incidence of reoperation among the assessed outcomes was higher for RA than for OA at 12 months. RA patients were found to be significantly more likely to be readmitted and experience systemic complications within 12 months following post-index surgery.

Patients with RA, diabetes, and kidney failure are among those most at risk for complications following BJA. In RA, there is increased risk from chronic inflammation, im-

munosuppressants, osteoporotic bone, and ligamentous laxity, which can lead to infection and implant failure.^{9,14,15} BJA has a reported complication rate of about 1.3%; however, literature suggests rates may be higher in RA patients compared to OA patients, specifically for infection and implant-related complications.^{14,16-18}

Compared with OA patients, this study demonstrated higher overall reoperation rates in RA patients following BJA at 12 months (5.5% vs. 3.0%) [Table 2]. This study's cumulative reoperation rate at 12 months for the OA cohort is within the range reported in the literature; for example, a retrospective study by Graham *et al.* found a reoperation rate within two years following thumb BJA of 1.5%.¹⁹ Another retrospective study by Mattila *et al.* identified 1,142 trapeziometacarpal arthroplasties performed over 10 years for basal thumb arthritis secondary to OA, and roughly 5% of these procedures required revision.²⁰ Compared to the present study, the small differences observed in reoperation rates could be influenced by variability in procedures used for BJA and differences in surgeon experience. A ret-

Table 3. Readmission/postoperative systemic complication rates in RA vs. OA matched patients.

Readmission/postoperative systemic complication	RA n = 1,032	OA n = 1,032	RR, CI	P value
	Incidence (%)			
7 days - 12 months post index surgery				
Re-admissions – CPT 1013659	107, (10.4%)	73, (7.1%)	1.5, (1.10-1.95)	0.008
Acute kidney failure – ICD N17	37, (3.6%)	21, (2.0%)	1.8, (1.04-2.99)	0.03
Acute Myocardial Infarction – ICD I21	15, (1.4%)	10* (0.9%)	1.5, (0.67-3.32)	0.3
Pneumonia, unspecified organism – ICD J18	39, (3.8%)	22, (2.1%)	1.8, (1.06-2.97)	0.02
Sepsis, unspecified organism – ICD A41.9	0 (0.00%)	0 (0.00%)	-	-
Acute embolism and thrombosis of deep venous thrombosis – ICD I82.4	0 (0.00%)	0 (0.00%)	-	-
Acute Cystitis or Urinary Tract infection, site not specified – N30, N39.0	81, (7.8%)	57, (5.5%)	1.4, (1.02-1.97)	0.03
Cellulitis of right/left finger – ICD L03.011, L03.012	0 (0.00%)	0 (0.00%)	-	-
Acute Respiratory Failure – ICD J96.0	0 (0.00%)	0 (0.00%)	-	-
Cerebral infarction – ICD I63	20, (1.9%)	17, (1.6%)	1.2, (0.62-2.33)	0.6

* To protect patient privacy, numbers are rounded up to 10. This may impact results, particularly for small cohorts and infrequent outcomes.

- Based on the outcome terms, the patient count is too small, so detailed results cannot be displayed

rospective study by Wilkens *et al.* identified 458 patients who underwent trapeziometacarpal arthroplasty and found that 4% had undergone reoperation, with 68% occurring within the first year.²¹ It was reported that unplanned reoperation was independently associated with index procedure type, surgeon experience, and younger age. Other literature with small sample sizes supports a similar sentiment: Cooney *et al.* performed a retrospective study of 654 patients and found a reoperation rate of 2.8% following BJA, and Megerle *et al.* performed a retrospective study of 343 patients and reported a reoperation rate following BJA of 2.9%.^{22,23}

Previous investigations have routinely excluded RA patients from their cohorts, and there is a paucity of studies directly comparing reoperation rates following BJA in RA vs. OA patients. However, literature including RA patients and analyzing reoperation rates following total joint arthroplasty in other joints exists as a reference. A retrospective study by Mooney *et al.* identified 541,744 primary total knee arthroplasties (TKAs), 7542 of which were in RA patients, and found a revision rate roughly the same in the RA cohort as in the OA cohort (3.6% vs. 3.7%).²⁴ Conversely, in a meta-analysis of 12 articles on revision rates following primary TKA, the RA cohort had a higher overall revision rate (3.8% vs. 3.0%) without a significant difference between cohorts.²⁵ Another retrospective study by Claxton *et al.* identified RA patients who underwent metacarpal phalangeal surface replacement arthroplasty and found a reoperation rate of 36% of 80 operations.²⁶ This reoperation rate is much higher than the reoperation rates presented in this study. The metacarpophalangeal (MCP) joints are among the most commonly affected joints in RA patients,^{27–30} and this increased involvement could potentially influence the reoperation rate. A systematic review of five research articles comparing RA and OA patients undergoing proximal interphalangeal arthroplasty demonstrated mixed results, with three studies showing higher reoperation rates in RA patients; however, these differences were not statistically significant.²⁷Click or tap here to enter text.

These findings matched the data presented in this study; higher rates of reoperation for all listed outcomes were observed in the RA cohort; however, the majority of these differences reached statistical significance.

Upon analyzing secondary outcomes such as readmissions and systemic complications after BJA, statistically significant differences were observed at twelve months. The likelihood of readmission within 12 months was 50 percent higher for RA patients than for OA patients. Within 12 months post-index BJA, RA patients were 80 percent more likely to experience acute kidney failure or pneumonia, and 40 percent more likely to be diagnosed with a urinary tract infection (UTI).

A retrospective study by Ling *et al.* looked at readmission and reoperation rates in 6,432 patients following BJA at one month without excluding RA patients. In comparison, this study found a readmission rate of 0.5%.²⁸ Ling *et al.* found that readmission was significantly associated with older age (greater than or equal to 75 years), body mass index (BMI) greater than or equal to 40, insulin-dependent diabetes, and chronic obstructive pulmonary disease (COPD). The propensity score matching used in this study was based on obesity, diabetes, and COPD to help mitigate differences in risk of readmission or reoperation between cohorts. This study also observed readmissions up to 12 months, which likely contributed to the increased readmission rates.

The majority of the observable systemic complications following BJA were significantly increased in the RA cohort at twelve months. Differences reaching statistical significance are also reported in the literature comparing RA vs. OA patients undergoing arthroplasty of larger joints. A retrospective study by Kurdi *et al.* used data from the Nationwide Inpatient Sample to compare total hip and total knee arthroplasty in RA vs. OA patients and found RA patients to be at significantly higher risk of postoperative infection, wound dehiscence, and systemic complications after both procedures.²⁹ In comparison, the lack of a statistically significant difference in postoperative infection following BJA

could be attributed to less surgical exposure time and invasiveness compared with total knee arthroplasty.³⁰

One limitation of this study is the reliance on medical coding for data collection. While using medical coding for retrospective studies can provide access to large amounts of data, it comes at the expense of the details and complexities that medical records provide. Therefore, the use of medical coding can lead to inaccurate inferences. The use of this database did not allow us to account for other factors that could influence the results, such as surgeon experience and disease severity. Another limitation of this study is the inability to differentiate readmissions related to the index surgery from those unrelated to it. Although the use of medical coding permitted the identification of readmission in patients following BJA, specific admitting diagnoses were not included.

CONCLUSION

When retrospectively analyzing reoperation and readmission rates in individuals aged 65 to 90 years with RA vs. OA, our study found significantly higher rates of reoperation and readmission in RA patients, with BJA at 12 months. Understanding the rates of reoperation in RA vs. OA patients can help enhance patient-physician-informed decision-making; larger prospective studies elucidating these data should be encouraged.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

DECLARATION OF ETHICAL APPROVAL FOR STUDY

The TriNetX database does not contain patient-identifiable information and is therefore exempt from Institutional Review Board review and approval. TriNetX is a global research network encompassing data from over 170 health-care organizations and more than 400 million patients. It contains de-identified, aggregate patient information covering procedures, diagnoses, medications, vital signs, genomics, and demographics. Healthcare Organizations (HCOs) involved in the TriNetX network contribute health-care data in de-identified, pseudoanonymized, or limited-data-set formats, in accordance with local privacy regulations. These HCOs authorize the usage of this data for research purposes on the TriNetX platform. In return for providing data, HCOs incur no financial expenses and gain access to data query tools, analytics, visualization capabilities, and the necessary hardware for software execution. The deidentification process conforms to HIPAA Privacy Rule standards, as verified by a qualified expert, meeting the requirements of §164.514(b)(1) and ensuring HIPAA compliance.

DECLARATION OF INFORMED CONSENT

The TriNetX database does not contain patient-identifiable information and is therefore void of information such as names, hospital identification numbers, or photographs

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