The Management of Perioperative Immunosuppressant Medications for Rheumatoid Arthritis During Elective Hand Surgery

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ABSTRACT

Purpose: Rheumatoid arthritis (RA) is a destructive inflammatory disease that commonly involves joints of the hand and wrist. Different recommendations exist for continuing or discontinuing immunosuppressant medications during the perioperative time period. The purpose of our study was to determine if continuing steroids, non-biologic DMARDs, and/or biologic DMARDs were associated with an increased risk of postoperative complications.

Methods: We performed a single-centered, retrospective review of a consecutive cohort of RA patients who had elective hand surgery by a single surgeon. Patients were included if they had a documented diagnosis of seropositive RA by a rheumatologist, and had elective hand surgery and/or disease-related surgical procedure involving the upper extremity from January 2008 to August 2018. We stratified patients into different groups for comparison by classes of immunosuppressant medications for managing RA. These classes included corticosteroids, non-biological DMARDs, biologic DMARDs, and/or no medications. Groups were then compared for the incidence of postoperative complications.

Results: Eighty-eight consecutive patients had elective hand and/or upper extremity surgeries for RA. Mean patient age at the time of surgery (±SD) was 55±13 years (range: 24 to 74 years). Of these 88 patients, eight (9%) overall complications occurred. Complications were wound healing failures, (n=5, 6%), tendon rupture, (n=1, 1%), hematoma, (n=1, 1%), and surgical site infection, (n=1, 1%). Perioperative medications included steroids (n=31), non-biologic DMARDs (n=68), and biologic DMARDs (n=5). There were no significant findings between patients on perioperative corticosteroids, non-biologic DMARDs, and/or biologic DMARDs and the incidence of complications. Mean follow-up was 69±65 weeks (range: 8 to 296 weeks).

Conclusions: Patients with RA who continued corticosteroids, non-biologic DMARDs, and/or biologic DMARDS within one dosing interval of their usual dose were not associated with a higher risk for postoperative complications compared to patients discontinuing these medications perioperatively, following elective hand surgery.

INTRODUCTION

Rheumatoid arthritis (RA) is the most common chronic destructive inflammatory disease. Synovial surfaces of the hand and wrist joints are affected in 70% of patients with RA. [1,2] If untreated, RA progresses to joint destruction and pain, disability, systemic complications, poor quality of life, and a decreased lifespan. [1] First-line medication management with immunosuppressing disease-modifying antirheumatic drugs (DMARDs) has proven to improve survival and decrease surgical interventions in patients with RA. [1-3] However, these medications prevent disease progression, and do not treat already damaged joints. [2,3]

As the disease progresses, surgery may be required to decrease pain, correct deformities, and increase range of motion. [2,4] Prior to any surgical procedure, many surgeons discontinue immunosuppressant medications to prevent the complications associated with wound healing and surgical wound infections. [4-10] Corticosteroids, non-biologic and biologic DMARDs are all classes of medications with different pharmacologic mechanisms and varying immunosuppressant activity commonly taken by patients diagnosed with rheumatoid arthritis to prevent disease progression. [3] Continuing steroids and non-biologic DMARDs, but holding biologic DMARDs weeks prior to having hip or knee surgery is currently recommended by the American College of Rheumatology and American Association of Hip and Knee Surgeons and the literature. [1,3,11-14] These recommendations include discontinuing etanerept 1week before surgery, infliximab, golimumab, tocilizumab, abatacept, adalimumab, certolizumab, 4 weeks before surgery, and rituximab 8 weeks before surgery. [1,3,11-14]

We could find no study in the literature that evaluated different combinations of perioperative immunosuppressant medications in a cohort of rheumatoid arthritis patients that had elective hand surgery. The primary purpose of our study was to determine if continuing steroids, non-biologic DMARDS, and/or biologic DMARDS was associated with increased postoperative complications. A secondary aim was to see what patient demographic variables and comorbidities were associated or predictors for developing specific complications in our patient population.

MATERIAL AND METHODS

Study design

We performed an Institutional Review Board (IRB#00196757) approved retrospective medical record review to collect a consecutive cohort of rheumatoid arthritis patients who had elective hand surgery by a single surgeon at a single institution. The STROBE checklist was followed throughout our review.

Study population

Patients were included if they had a documented diagnosis of seropositive rheumatoid arthritis by a rheumatologist with an International Classification of Diseases (ICD) 9 code of 714.0 or ICD 10 code of M06.9, and had elective hand and/or upper extremity surgery between January 2008 to August 2018. Diagnosis of rheumatoid arthritis was confirmed by a rheumatologist with the 2010 American College of Rheumatology (ACR)/European League Against Rheumatism (EULAR) classification criteria.

We stratified patients into different groups for comparison by classes of chronic medications for managing rheumatoid arthritis taken during the perioperative period. These classes included corticosteroids, non-biological DMARDs, biologic DMARDs, and/or no medications. Biologic DMARDs were considered as perioperative medications if the time of surgery was within one dosing interval of that individual's standard medication regimen. Groups were then evaluated for the incidence of postoperative complications and compared to determine if classes of medications had any association.

Demographic variables

Patient characteristics are summarized in Table 1. These include: mean age, sex, body mass index (BMI), Race, Ethnicity, employment status, smoking status (current every day smoker or quit within past 6 months), moderate alcohol use (≥ 1 drink a day for women, ≥ 2 drinks a day for men), illicit drug use, comorbidities, and chronic medications to manage rheumatoid arthritis.

Outcomes analyzed

Primary outcomes measured were the number of complications evaluated and confirmed by a healthcare provider during patient follow-up. Complications were wound healing failure, tendon rupture, hematoma, surgical site infection, and overall complications. Non-healing wounds or wound healing failure was clinically defined as the absence of healthy granulation tissue, presence of necrotic and unhealthy tissue in the wound bed, excess exudate and slough, lack of blood supply, re-epithelialization failure, persistent pain, recurrent breakdown of the wound, or clinical or subclinical infection. Tendon rupture was defined as the tendon partially or completely separating from tissue to which it was attached, and confirmed with diagnostic imaging. Hematoma was defined as a collection of blood within the tissue and confirmed with diagnostic imaging. Surgical site infection was defined by the Centers for Disease Control and Prevention (CDC) as an infection occurring at the surgical site within 30 days of the operation without an implant or within a year of the operation with an implant. [19] Overall complications were defined as the sum of all complications occurring in a perioperative medication group.

Statistical analysis

Statistical analysis was performed to compare complications to different combinations of perioperative rheumatoid arthritis medications. We used the crosstabulation Fisher's exact test for categorical complication variables based on the nonparametric distribution of population data, small sample sizes, and disproportionate sizes of comparative groups. Bimodal logistic regression was used to compare patient demographic variables to specific complications to identify individual predictors for occurrence.

Table 2. Complications associated with continuing medications perioperatively for elective hand surgery

Complications	Steroids (n=2)	Steroids, non-biologics (n=25)	Steroids, biologics (n=1)	Steroids, non-biologics, biologics (n=2)	Non-biologics, biologics (n=1)	Biologics (n=1)	Non-biologics (n=39)	No medication (n=27)	p-value
Wound healing failure	0	1	0	0	0	0	1	3	0.427
Tendon rupture	0	0	0	0	0	0	0	1	0.273
Hematoma	0	0	0	0	0	0	0	1	0.273
Surgical site infections	0	1	0	0	0	0	0	0	0.568
Overall	0	2	0	0	0	0	1	5	0.299

RESULTS

Demographics

Table 1 contains our patient demographics. Eighty-eight consecutive patients had elective hand and/or upper extremity surgery for seropositive RA over the ten-year study period (mean age 55±13, range: 24 to 74 years). Surgical procedures were performed on 42 right upper extremities and 46 left upper extremities. Fingers were involved in 44 cases, wrists 42 cases, forearms 4 cases, and the elbow in 10 surgical cases. Combinations included 5 cases involving fingers and wrists, 2 forearms and elbows, 2 wrists and elbows, 1 wrist and forearm, and 3 fingers and elbows. Perioperative medications included steroids (n=31), non-biologic DMARDs (n=68), and biologic DMARDs (n=5). Biologic DMARDs continued were adalimumab (n=2) within two weeks of surgery, abatacept (n=1) within four weeks of surgery, and tocilizumab (n=2) within one week of surgery. Mean follow-up was 69±65 weeks (range: 8 to 296 weeks).

Wound healing failure

Eight patients developed complications. Five of the eight (63%) complications were wound healing failures (Table 2). Of these five, one case occurred in a patient taking steroids and non-biologics, one case occurred in a patient taking only non-biologics, and three cases occurred in patients on no medications. There were no significant increased risks of wound healing failure in patients taking steroids, non-biologic DMARDs, and/or biologic DMARDs during the perioperative period (p=NS). Following bimodal logistic regression, there were no significant positive predictors for wound healing failure among our study demographic variables (p=NS).

Tendon rupture

One of the eight (13%) complications was tendon rupture (Table 2). The surgery performed preceding was a synovectomy of the left 4th, 5th, and 6th extensor compartments, resection of left distal ulna, and suspension of the ulnar shaft using a distally based extensor carpi ulnaris tendon. Three months following the procedure, magnetic resonance imaging (MRI) confirmed rupture of the left extensor tendons of fingers 3, 4, and 5. This one case occurred in a patient taking no medications. The patient stated the ruptured occurred two months prior from no known inciting event. There were no significant increased risks of tendon rupture in patients taking no medications, steroids, non-biologic DMARDs, and/or biologic DMARDs during the perioperative period (p=NS). Following bimodal logistic regression, there were no significant positive predictors for tendon rupture among our study demographic variables (p=NS).

Hematoma

One of the eight (13%) complications was a hematoma (Table 2). This one case occurred in a patient taking no medications. There were no significant increased risks of hematoma in patients taking no medications, steroids, non-biologic DMARDs, and/or biologic DMARDs during the perioperative period (p=NS). Following bimodal logistic regression, there were no significant positive predictors for hematoma among our study demographic variables (p=NS).

Surgical site infection

One of the eight (13%) complications was a surgical site infection (Table 2). This one case occurred in a patient taking steroids and non-biologics (p=NS). There were no significant increased risks of surgical site infections in patients taking steroids, non-biologic DMARDs, and/or biologic DMARDs during the perioperative period. Following bimodal logistic regression, there were no significant positive predictors for surgical site infections among our study demographic variables (p=NS).

Overall complications

There were eight overall complications in 88 (9%) hand surgery cases (Table 2). Two (25%) in patients taking steroids and non-biologics, one (25%) in patients taking only steroids, and five (63%) in patients taking no medications (p=NS). There were no significant increased risks of overall complications in patients taking steroids, non-biologic DMARDs, and/or biologic DMARDs during the perioperative period. Following bimodal logistic regression, there were no significant positive predictors for overall complications among our study demographic variables (p=NS).

Table 1. Patient demographic variables

Variable		N=88	Percent
Age, mean±SD		55±13	---
Sex, male		13	15
BMI, mean±SD		28.9±8	---
Race			
	White or Caucasian	68	77
	Black or African American	17	19
	Asian	2	2
	Other	1	1
Ethnicity			
	Not Hispanic or Latino	87	99
	Hispanic or Latino	1	1
Employment status			
	Full-time	20	23
	Part-time	2	2
	Retired	26	30
	Unemployed	9	10
	Disabled	17	19
	Unknown	14	16
Current smoker		23	26
Alcohol use		21	24
Illicit drug use		2	2
Comorbidities			
	Diabetes mellitus	15	17
	Hypertension	31	35
	Heart failure	4	45
	COPD	18	20
	Lung nodules	7	8
	Hypothyroidism	12	14
	Hyperthyroidism	2	2
	PAD	5	6
	ESRD	0	0
	Cirrhosis	10	11
Immunomodulating medications			
	Corticosteroids	31	35
	Non-biologic DMARDS	68	77
	Biologic DMARDS	5	6
Surgical location			
	Upper extremity, right	42	48
	Finger	44	50
	Wrist	42	48
	Forearm	4	5
	Elbow	10	11

CONCLUSION

- Patients with seropositive RA who continued corticosteroids, non-biologic DMARDs, and/or biologic DMARDS did not have a higher occurrence of postoperative complications compared to patients discontinuing these medications perioperatively, following elective hand surgery. There were no associated predictors for patients developing postoperative complications. Our findings suggest patients with RA may be able to continue medications during elective hand surgery. A prospective randomized controlled trial should be performed to validate our study findings.

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