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Complications - Infection

# Perioperative Dexamethasone Administration Does Not Increase the Incidence of Postoperative Infection in Total Hip and Knee Arthroplasty: A Retrospective Analysis

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ABSTRACT

*Background:* Dexamethasone is frequently used for the treatment of postoperative nausea and vomiting and as an adjunct in multimodal postoperative analgesia after total joint arthroplasty; however, the incidence of periprosthetic joint infection (PJI) after the use of perioperative dexamethasone in total joint arthroplasty has yet to be fully elucidated.

*Methods:* A retrospective chart review was conducted of all patients who underwent total hip or knee arthroplasty (N = 6294) between January 1, 2002 and January 31, 2014. The primary outcome was PJI requiring surgical intervention. Patients were subdivided into 2 cohorts; patients who received perioperative dexamethasone, a single 4- to 10-mg intravenous dose, as prophylaxis against postoperative nausea and vomiting (Dex group; N = 557) and those that did not receive perioperative dexamethasone (No Dex group; N = 5737). Secondary measures included timing of infection, culture data, and the type and number of subsequent procedures. Statistical analysis was performed using a chi-square or Fisher's exact test where appropriate.

*Results:* Seventy-four joints of the 6294 joints included in this analysis ultimately developed a PJI for an overall incidence of infection of 1.2%. Seven of the 557 joints (1.3%) in the Dex group developed a PJI; 67 of the 5737 joints (1.2%) in the No Dex group developed an infection. This difference was not significant ($P = .8022$). No significant difference in the timing of infection or the number of subsequent procedures was seen.

*Conclusion:* A single intravenous perioperative dose of dexamethasone had no statistically significant difference in the rate of PJI after total hip or knee arthroplasty.



Total joint arthroplasty is one of the most effective surgical treatments for end-stage arthritis of the hip and knee [1]. Over the past 2 decades, the demand for these procedures has substantially increased, and future demand is projected to grow exponentially [2,3]. Postoperative nausea and vomiting (PONV) and acute postsurgical pain pose a significant challenge in the acute rehabilitation period after total joint arthroplasty. Inadequately controlled PONV and/or pain have been directly correlated with poor patient satisfaction and can lead to delays in the acute recovery period [4-7]. As demand for these procedures has increased, there has been increased emphasis on multimodal analgesia to reduce acute postsurgical pain and improve PONV [8-14].

Glucocorticoids have well-known potent anti-inflammatory and antiemetic effects. Low-dose systemic dexamethasone (4-10 mg) has been shown to be effective in reducing PONV [15,16]. Higher doses of dexamethasone and other various glucocorticoids have also been purported to significantly improve postoperative pain, improve acute postoperative rehabilitation, shorten hospital stays, reduce fatigue, and reduce systemic inflammatory response after surgery [17-19]. As a result, dexamethasone has had an

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increasing perioperative role in prevention of both PONV and as part of a multimodal pain management strategy after total joint arthroplasty [20].

The side effects of dexamethasone include increased risk of thromboembolism, peptic ulceration, delayed wound healing, hyperglycemia, and infection [21]. Periprosthetic joint infection (PJI) after total hip and knee arthroplasties is a devastating complication with increased morbidity and mortality. Despite the well-documented efficacy of dexamethasone in alleviating PONV and postoperative pain, questions regarding the safety of dexamethasone in the perioperative period remain largely unanswered [22].

We therefore performed this retrospective review to determine whether a single dose of dexamethasone in the perioperative period after total hip or total knee arthroplasty was associated with an increased risk of PJI. To our knowledge, this is the first study to investigate infection rates after perioperative dexamethasone administration in total joint arthroplasty surgery as a primary outcome.

## Materials and Methods

After institutional review board approval, a retrospective chart review was conducted of all patients who underwent primary total hip or knee arthroplasty at our institution between the dates of January 1, 2002 and January 31, 2014. Exclusion criteria included any primary joints not performed at our institution, previous open surgery with or without hardware placement, and previous infection in the joint undergoing total joint arthroplasty. Patients were identified through an institutional database using Current Procedural Terminology codes for primary total hip and knee arthroplasties (codes 27130 and 27447, respectively). Using these search criteria, we identified 6294 joints (5257 patients) who met our criteria. The patients were then subdivided based on if they received Dexamethasone in the perioperative period (Dex group; N = 557) or if they did not receive perioperative dexamethasone (No Dex group; N = 5737).

Over this time period, dexamethasone was routinely given to patients for prophylaxis against PONV. Dosing protocols were based on previously described protocols for prophylaxis against PONV [15,19]. Patients who were determined to require prophylaxis against PONV received a 4- to 5-mg dose of dexamethasone; patients determined to be high risk for PONV received an 8- to 10-mg dose of dexamethasone. Dexamethasone was administered either intraoperatively or in the acute postoperative (1-2 hours) period in the postanesthesia care unit at the discretion of the attending anesthesiologist. Dexamethasone was routinely used in all patients in whom PONV prophylaxis was deemed necessary, including diabetics. No alterations to the dosing protocol were made because of comorbid medical conditions including diabetes mellitus.

Patients who were diagnosed with a PJI and required subsequent surgical intervention were identified. Diagnosis of PJI was based on need for return to the operating room (due to clinical signs and symptoms of infection, clinically significant drainage, presence of a positive joint aspirate culture, a joint aspirate white blood cell count of >2500/μL). Demographic data for each patient were recorded including age at the time of index procedure, gender, body mass index, primary procedure, and primary indication for joint arthroplasty. The medical history for each patient was reviewed, and risk factors for infection were documented including obesity, diabetes mellitus, smoking history, compromised immune status, and immunosuppressive therapy. Dexamethasone dose and timing of administration were also collected. Infection data including timing of infection, culture data, and the type and number of subsequent procedures were recorded. Proportions were examined using a chi-squared or Fisher's exact test where appropriate. All $P$ values were 2-tailed and $P < .05$ was regarded as significant.

**Table 1**
Patient Demographics.

| Characteristic | Dexamethasone (n = 7) | | No Dexamethasone (n = 67) | |
|---|---|---|---|---|
| Average age | 61.3 | | 60.3 | |
| Average BMI | 32.4 | | 31.1 | |
| | n | % | n | % |
| Diabetes mellitus | 2 | 28.6 | 11 | 16.7 |
| Tobacco abuse | 2 | 28.6 | 22 | 34.9 |
| Inflammatory arthritis | 0 | 0 | 5 | 12.7 |
| Immune deficiency | 1 | 14.3 | 0 | 0 |

BMI, body mass index.

## Results

A total of 6294 primary total hip and knee arthroplasties (2702 hips; 3592 knees) were included in this review. Of those, 74 joints (28 hips; 46 knees) were diagnosed with a PJI with an overall incidence of infection of 1.2%. Demographic data for these cases are listed in Table 1. There was no significant difference in the average age of the patient, average body mass index, or distribution of hip and knee arthroplasties. There were no significant differences in the number of diabetics who developed an infection between the 2 groups (Dex = 2; No Dex = 11); similarly, the number of smokers who developed infection in each group was not significantly different (Dex = 2; No Dex = 22). There were a total of 5 joints in the No Dex group who developed a PJI with a preop diagnosis of inflammatory arthritis (1 with psoriatic arthritis, 2 with rheumatoid arthritis, and 2 with juvenile arthritis). The Dex group had 1 patient with an immune deficiency (IgA-IgM deficiency) who developed a PJI.

Administration of dexamethasone in the perioperative period did not significantly increase the rate of PJI between the 2 groups (Table 2). The incidence of PJI in the Dex group was 1.3% (7 of 557 joints), whereas the incidence in the No Dex group was 1.2% (67 of 5737 joints). This was not a significant difference ($P = .8022$). Perioperative dexamethasone did not significantly affect the timing of PJI. The incidence of early infection (<6 weeks from surgery) in the Dex group was 0.5% (3 of 557 joints), and in the No Dex group, the incidence was 0.7% (38 of 5737 joints). At 1-year post-op, the incidence of infection between the 2 groups remained similar, with 5 joints in the Dex group (0.8%) and 47 joints in the No Dex group (0.9%). A total of 59 joints had a culture-positive PJI (Dex = 6 joints; No Dex = 53). Of the 7 patients in the

**Table 2**
Infection Data.

| | Dexamethasone (n) | | No Dexamethasone (n) | | Total (n) | |
|---|---|---|---|---|---|---|
| Number of joints | 557 | | 5737 | | 6294 | |
| Number of THAs | 271 | | 2431 | | 2702 | |
| Number of TKAs | 286 | | 3306 | | 3592 | |
| | n | % | n | % | n | % |
| Number of PJIs | 7 | 1.3 | 67 | 1.2 | 74 | 1.2 |
| | n | % | n | % | | |
| Infection <6 wk post-op | 3 | 0.5 | 38 | 0.7 | | |
| Infection <1 y post-op | 5 | 0.9 | 47 | 0.8 | | |
| Infection >1 y post-op | 2 | 0.4 | 20 | 0.3 | | |

THA, total hip arthroplasty; TKA, total knee arthroplasty; PJI, periprosthetic joint infection.