Use of Postoperative Antibiotics in Elective Soft Tissue Hand Surgeries

Fares Uddin, MBBCh BAO LRCP&SI* Naif AlHamam, MBBS, SB-ORTH**
Aamina Khan, MBBCh BAO LRCP&SI*** Mohammad Alasker, MBBCh BAO LRCP&SI****
Ahsan Butt, MBBS, FRCS(Ed), FRCS (Tr. & Orth)*****

Objective: To evaluate prophylactic postoperative antibiotic use in elective soft tissue hand surgeries.

Design: A Retrospective Cohort Study.

Setting: King Hamad University Hospital, Bahrain.

Method: Retrospective review of 309 patients undergoing elective soft tissue hand surgery from 2012 to 2015. One hundred fifty-nine (51.5%) of these patients received postoperative prophylactic antibiotics while 150 (48.5%) did not. The records were reviewed for the type of procedure performed, comorbidities, use of postoperative antibiotics, outpatient visits and associated complications.

Result: One hundred fifty-nine (51.5%) patients (group I) received postoperative prophylactic antibiotics and 150 (48.5%) did not (group II). Four (1.3%) patients had infection (3 from group I and 1 from group II). One (0.3%) patient had deep surgical site infections and 2 (0.6%) patients had superficial surgical site infections, all received postoperative antibiotics. The P-Value obtained was 0.63.

Conclusion: Our study failed to demonstrate a benefit of prescribing prophylactic postoperative antibiotics to patients undergoing elective soft tissue hand surgery. Unwarranted antibiotic administration may pose harm to the patient as gastrointestinal side effects, allergic reactions and/or antimicrobial resistance.

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Surgical site infection (SSIs) is the most common cause of hospital-acquired infections, contributing to over one-third of hospital acquired infections. Two to five percent of all patients undergoing surgical interventions each year are predicted to develop SSIs[1,2].

Surgical site infections are defined as "an infection related to an operative procedure that occurs at or near the surgical incision within 30 days of the procedure or 90 days if prosthetic material implanted"[3-5]. Bratzler et al described a new clinical criterion for defining SSIs[6]. The diagnosis is made when one or more of the following is present: a purulent exudate, a positive fluid culture, surgeon's diagnosis of infection or a surgical site that requires reopening[6].

A wound classification developed over 35 years ago based on the amount of expected microbial contamination is still largely used in clinical practice today[7]. Wounds were classified as clean, clean-contaminated, contaminated or dirty. There is a moderate correlation between the wound classification and SSI rates as demonstrated by several studies. Rates varied from 1.3 to 2.9 percent for clean wounds, 2.4 to 7.7 percent for clean-contaminated wounds, 6.4 to15.2 percent for contaminated wounds, and 7.1 to 40 percent for dirty wounds[8-11]. Though easy to apply and utilize, this system has been found to be a poor predictor of the overall risk of SSIs.

Operative technique, the length of surgery, and comorbidities are other important factors for predicting infectious risks. The setup of the healthcare facility is also a determining factor; nonteaching hospitals having the lowest rates of infection compared to small or large teaching hospitals (4.6 versus 6.2 and 8.2 percent, respectively)[12]. SSI rates in ambulatory surgery are also relatively low, 0.31 and 0.48 percent at 14 and 30 days postoperatively[13].

* Senior House Officer
** Fellow Adult Hip and Knee Arthroplasty
Orthopedic Surgery
Toronto Western Hospital – University of Toronto
Toronto, Ontario, Canada
*** Senior House Officer
**** Intern
***** Consultant Arthroplasty and Orthopedic Surgeon
Department of Orthopedic Surgery
King Hamad University Hospital
Email: fares.uddin@khuh.org.bh, ahsan.butt@khuh.org.bh

In orthopedic surgery, the use of prophylactic antibiotics in traumatic open injuries and implants is well established. In open injuries, the risk of infection is increased as a result of contamination from the external environment; in implants procedures, antibiotics are mandatory as a precautionary against infections. Prophylactic antibiotics have shown to reduce infection rates in large joint replacements[14]. Procedures utilizing K-wires, as well as other metallic or silicone implants should also receive prophylactic antibiotics[15].

Antibiotic prophylaxis is not warranted for clean orthopedic surgeries, including arthroscopy and other procedures with no implantation of foreign materials[6,16]. Kleinert et al reported an overall infection rate of 1.4 percent[17]. In a review of carpal tunnel releases, an infection rate of 0.47 was reported[18]. Ariyan et al reported similar rates in their series of carpal tunnel surgeries[19]. Infection rates decrease in procedures lasting less than 2 hours[9,15, 20-23].

Factors such as diabetes and smoking have been found to be strong independent predictors for postoperative infection[20,24]. Some authors even recommend the use of prophylactic antibiotics with elective hand surgeries in rheumatoid arthritis, diabetes and patients on steroid[15,20,25].

The aim of this study is to evaluate the trends of postoperative antibiotic prophylaxis and the incidence of surgical site infections.

METHOD

All orthopedic surgeons use intravenous preoperative antibiotics.

Three hundred nine elective orthopedic hand surgeries were reviewed from 2012 to 2015. It included carpal tunnel release, mass excisions, trigger finger release and first dorsal compartment release. All mass excisions comprised of ganglion excisions save for one granuloma removal. The procedures performed concomitantly with a joint or bone, involving implants and tendon repair were excluded as antibiotics are routinely administered with these. All revision procedures or those involving an incision into a prior operative site were also excluded. Those with incomplete medical records were excluded.

Personal characteristics and risk factors were documented. All patients were given a single dose of Cefuroxime, 750 milligrams intravenously preoperative after induction but prior to skin incision. The use of postoperative antibiotic prophylaxis, the type of the antibiotic agent, the duration of antibiotic therapy, the suture material, the suture type, the type of dressing, and the date of suture removal were documented. One hundred fifty-nine patients received postoperative prophylactic antibiotics while 150 did not.

During the procedure, all patients were scrubbed with povidone-iodine solution. The surgical site was then dried with sterile towels and draped utilizing sterile precautions. Following the respective procedure, the surgical sites were all irrigated with 0.9% saline prior to closure. Closure of the wound was at the discretion of the consultant.

All patients received an initial follow-up 10-14 days after the procedure. Subsequent follow-up ranged from one week to one month. Non-absorbable sutures removed 9 to 17 days postoperatively. Surgical wound infections are most likely to occur during the first 30 days postoperative period[26,27]. Clinic visits, inpatient records, and emergency department visits were reviewed.

Descriptive analysis of the collected data was performed. Statistical hypothesis testing was conducted via Pearson's chi-squared test, assessing the relationship between the nominal values of postoperative antibiotic use and the presence of infection. Statistical significance was defined as $P<0.05$.

RESULT

Three hundred nine patients were included in the study, 127 (41.1%) trigger finger release, 112 (36.2%) carpal tunnel release, 49 (16%) ganglion excision, 19 (6.1%) De Quervain's tenosynovitis release, and 2 (0.6%) other mass excisions, see table 1. One hundred eighty-three (59.3%) patients had diabetes, see table 2. Postoperative antibiotic was prescribed for 159 (51.5%) patients, see table 3. Three of the four diagnosed patients with infection had received postoperative antibiotics. One case was diagnosed as deep infection necessitating hospital admission and intravenous antibiotics. The infection resolved without requiring surgical irrigation and debridement.

Table 1: Elective Soft Tissue Hand Surgeries

Procedures	Number and Percentage
Ganglion Excision	49 (15.9)
Trigger Finger Release	127 (41.1)
Carpal Tunnel Release	112 (36.2)
De Quervain's TS Release	19 (6.1)
Other Mass Excisions	2 (0.6)
Total	**309 (100)**

Table 2: Presence of Diabetes

	Number and Percentage
Diabetic	183 (59.3%)
Not Diabetic	126 (40.7%)
Total	**309 (100%)**

Table 3: Postoperative Antibiotic Use

Antibiotics Use	Number and Percentage
Yes (group I)	159 (51.5)
No (group II)	150 (48.5)
Total	**309 (100%)**

Four (1.3%) cases of postoperative infection were detected during three-years, see table 4. The four cases were as follows: 1. carpal tunnel release, superficial infection, postoperative antibiotics had been prescribed; 2. ganglion excision, superficial infection, postoperative antibiotics had been prescribed; 3. carpal tunnel release, superficial infection, no postoperative antibiotics prescribed; 4. carpal tunnel release, deep infection,

postoperative antibiotics had been prescribed. Three cases of superficial infection and one deep infection, see tables 5 and 6. All but one case of diagnosed infection had received prophylactic postoperative antibiotics. The P-value was 0.63.

Table 4: Postoperative Infection

Infection	Frequency	Percent (%)
Yes	4	1.3%
No	305	98.7%
Total	**309**	**100%**

Table 5: Superficial Infection and Antibiotic Treatment

Postoperative Antibiotics	Number	Frequency (%)
Yes (group I)	2	66.6%
No (group II)	1	33.3%

Table 6: Deep Infection and Antibiotic Treatment

Postoperative Antibiotics	Number	Frequency
Yes (group I)	1	100%

DISCUSSION

The use of postoperative antibiotics may protect patients from SSIs, but routine prescription poses several risks.

Trigger finger release, carpal tunnel release, and ganglion excision were more than 80% of cases, which is similar to other studies[28]. Diabetes affected more than 50% of the patients.

Prophylactic antibiotics have been described for at-risk populations undergoing surgery such as those with diabetes mellitus and smokers[15,20,24,25]. Pavel et al found that prophylactic antibiotics decreased infection rates from 5% to 2.8%[29].

Mathur et al demonstrated no significant difference between patients who received postoperative antibiotics and those who did not[30]. Another study of elective hand surgeries revealed an overall surgical site infection rate of 0.35% with no significant difference between those who received antibiotics and those who did not[31].

In this study, infection was associated with smoking, diabetes mellitus, and prolonged procedures. Harness et al, in carpal tunnel release surgeries, found no difference in infection rates with antibiotic use including in patients with diabetes mellitus[26]. Whittaker et al found no difference between patients receiving intravenous antibiotics, intravenous antibiotics followed by oral antibiotics, or an oral placebo[32].

Hoffman et al found that prophylactic antibiotic use is effective only in reconstructive procedures with large flaps, implant arthroplasty, procedures of long duration, and complex open hand trauma[21]. Its use is not warranted in clean elective procedures lasting less than two hours[22]. Other studies have demonstrated increased infection rates in surgeries lasting more than two hours[11,23].

CONCLUSION

Our study failed to demonstrate a benefit of prescribing prophylactic postoperative antibiotics to patients undergoing elective soft tissue hand surgery. Unwarranted antibiotic administration may pose harm to the patient as gastrointestinal side effects, allergic reactions and/or antimicrobial resistance. Furthermore, it places a great burden on the healthcare system.

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