Prevalence of Surgical Site Infections Following Orthognathic Surgery: A Retrospective Cohort Analysis

Clayton M. Davis, BSc, DDS, Curtis E. Gregoire, DDS, MD, MSc,† Thomas W. Steeves, BSc,‡ and Amanda Demsey, BSc, DDS§*

Purpose: The purpose of this retrospective study was to determine the prevalence of surgical site infection (SSI) after orthognathic surgery at the Department of Oral and Maxillofacial Surgery of Capital Health and Dalhousie University (Halifax, NS, Canada).

Patients and Methods: A retrospective chart review of all patients undergoing orthognathic surgery from October 2005 through April 2013 was performed. The outcome variable was SSI. The primary predictor variable was the antibiotic used for prophylaxis. The secondary predictor variables were patient demographics, such as age, gender, medical comorbidities, and smoking status; duration of surgery; wisdom teeth extractions; single-jaw or bimaxillary surgery; and type of surgery. Data also were gathered on the diagnosis of SSIs and the treatment to resolve these infections.

Results: In total, 2,521 patients underwent surgery, and 253 patients did not meet the inclusion criteria; therefore, the charts of 2,268 patients were reviewed (mean ± standard deviation, 26.9 ± 11.7 yr of age). Eight percent of patients developed an SSI. None of the patient demographics was associated with an increased risk for infection. Most initial infections (62%) and most recurrent infections (78%) occurred in the mandible. Twenty-six percent of patients who developed SSIs had recurrent infections after antibiotic treatment. SSIs necessitated hardware removal for 14% of patients. Adverse effects from the antibiotics were seen in 4.2% of patients. Infection was most frequently diagnosed 11 to 15 days postoperatively. The average length of surgery for patients who did not have an SSI was 136 minutes compared with an average of 157 minutes for patients who had an SSI (odds ratio = 1.0051; 95% confidence interval, 1.0026 to 1.0076; $P < .001$). Wisdom teeth were extracted in 49.6% of the 2,268 cases. The mean SSI prevalence for multiple jaw procedures (9.2%) was significantly higher than that for single surgical procedures (5.3%; $P = .0013$). Isolated Le Fort surgeries had a significantly lower prevalence of infection compared with the mean prevalence (3.9%; $P = .02$), whether they were single piece or segmented (3.5 and 4.3%, respectively; $P = .98$). The prevalence of infection was significantly lower in the cefazolin group (6.2%) compared with the penicillin (14.3%; $P < .0001$) and clindamycin (10.4%; $P < .02$) groups.

Conclusions: The prophylactic use of first-generation cephalosporins, such as cefazolin, appears to be more effective than penicillin and clindamycin for preventing SSIs in orthognathic surgery. In addition, bimaxillary surgery, mandibular procedures, and duration of surgery might demand antibiotic prophylaxis that is more effective. The presence of third molars and patient demographics are not risk factors for SSIs. A prospective randomized controlled study is underway to investigate the findings of this study.
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*Resident, Department of Oral and Maxillofacial Surgery, Capital Health and Dalhousie University, Halifax, NS, Canada.

†Division Head, Department of Oral and Maxillofacial Radiology, Faculty of Dentistry; Assistant Professor, Department of Oral and Maxillofacial Sciences, Capital Health and Dalhousie University, Halifax, NS, Canada.

‡Dentistry Student and Research Assistant, Capital Health and Dalhousie University, Halifax, NS, Canada.

§Private Practitioner; Dalhousie University, Halifax, NS, Canada.

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Address correspondence and reprint requests to Dr Davis: Department of Oral and Maxillofacial Surgery, Capital Health and Dalhousie University, 1276 South Park Street, Halifax, NS B3H 2Y9, Canada; e-mail: cdavis.omfs@gmail.com

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Orthognathic surgery is a commonly performed oral and maxillofacial surgical procedure. This surgery is primarily for patients with severe dentofacial deformities that require surgical repositioning of the maxilla or mandible to obtain proper occlusal function and esthetic facial harmony. The 3 main procedures are Le Fort I osteotomies (with a 1-piece or segmented maxilla), mandibular osteotomies, bilateral sagittal split osteotomy (BSSO) and intraoral vertical ramus osteotomy, and functional genioplasty (FG). All these procedures are performed intraorally. The oral cavity has a high bacterial load and contains multiple potential pathogens.[1] Despite rigorous antiseptic techniques, procedures that involve incising the oral mucosa are considered clean-contaminated surgeries with an expected infection rate of 10 to 15%.[2] Surgical site infections (SSIs) can negatively affect treatment outcomes and require additional procedures to resolve the infections and therefore can increase costs to the health care system.[1]

To decrease the prevalence of SSIs, prophylactic antibiotics are commonly used before invasive surgeries. The benefit of prophylaxis is well established and extensively researched; however, many classes of antibiotics are used, which can create a difficult decision when choosing the most appropriate antibiotic for patient care.[1] Penicillin is the antibiotic most commonly described in the literature for prophylaxis in orthognathic surgery.[3-5] Amoxicillin or ampicillin also have been suggested by several studies.[2,6,7] Other studies have used amoxicillin plus clavulanate, cefuroxime, cefpiramide, or clindamycin.[8-10] The maxillofacial surgeons involved in this study commonly use cefazolin; clindamycin is used for patients who are allergic to penicillin. With the abundant choices of antibiotics available for health care, it is important to determine which antibiotic best decreases the risk of SSIs.

The demographics of patients also can affect their predisposition to SSIs. The age of patients has been correlated to an increased risk of SSI.[11] Gender has not been shown to be a risk factor for SSI.[12] Medical conditions that compromise the immune system, immunosuppressant medications, and smoking are well-known risk factors for many types of diseases, including infections.[11] Antibiotic regimens might need to be more rigorous for a given patient based on that patient's demographics.

Various surgical features also can affect the prevalence of SSIs. BSSOs and intraoral vertical ramus osteotomies are more prone to SSIs than Le Fort surgeries because the mandible is less vascular than the maxilla and has pooling of saliva and food debris that can occur along the incisions in the mandibular vestibule.[13] Because the incisions take approximately 3 days to heal, bacteria in saliva can freely enter the incision sites for a short time after surgery.[13] Longer surgeries and multiple jaw surgeries also pose a higher risk of SSI.[11] In addition, the literature varies as to whether third molar extraction during surgery poses a risk for SSI.[11,12] If a specific surgery or combination presents a higher risk of a SSI, then this might warrant closer attention to a more effective antibiotic choice for these surgical cases.

Some studies have advocated extended regimens of antibiotics after orthognathic surgery to achieve more acceptable rates of SSI, although the recommended length varies among studies.[12,14] Currently, there is no consensus with regard to the most effective prophylactic antibiotic in preventing such events. The most common antibiotic used for prophylaxis in orthognathic studies is penicillin, and the most common duration is 1 day.[3-5] Studies by Chow et al[12] and Bentley et al[14] recommended extending penicillin coverage for 2 and 5 days, respectively. Amoxicillin or ampicillin also has been suggested by several studies.[2,6,7] Other studies have used amoxicillin plus clavulanate, cefuroxime, cefpiramide, or clindamycin.[8-10]

The goal of this retrospective study was to determine whether the antibiotic used for prophylaxis affected the prevalence of SSIs after orthognathic surgery at the Nova Scotia Health Authority. In addition, this study attempted to determine whether this prevalence was affected by patient demographics, such as age, gender, medical comorbidities, and smoking status; duration of surgery; third molar extractions; bimaxillary surgery; and type of surgery. This information can be valuable for decreasing the prevalence of SSIs, overuse of antibiotics, and financial burdens on the health care system.

Patients and Methods

PATIENTS AND DATA COLLECTION

A retrospective cohort analysis was conducted of consecutive patients undergoing orthognathic surgery from October 2005 through April 2013 at the Department of Oral and Maxillofacial Surgery at Capital Health and Dalhousie University (Halifax, NS, Canada). Ethical approval for chart review was obtained from the Capital Health research ethics board of Nova Scotia. The authors reviewed patient information from the hospital electronic database and paper charts. All patients older than 16 years with dentofacial deformities or obstructive sleep apnea who underwent a Le Fort osteotomy, BSSO, or FG or any combination of these were included. Patients who did not return for follow-up or had insufficient information in the chart were excluded.

The charts of 2,268 patients were reviewed in detail. Information extracted from the charts included patient demographics, such as age, gender, and medical and smoking statuses; the antibiotic used for prophylaxis (cefazolin, clindamycin, or penicillin); details of the surgical procedure (type, duration, whether third molars were extracted); and if the patient had an SSI after surgery. The medical statuses were organized into 3 categories: the patient is healthy (class 1); the patient has a medical condition that does not increase risk of infection (class 2); or the patient has a medical condition that increases the risk of infection (class 3). Patients were considered smokers if they were an active smoker at the time of surgery or had quit less than 3 months before their surgery. A positive smoking status (cigarettes or marijuana) and drinking more than 2 servings of alcohol per day also categorized the patient as having a class 3 medical status.

ANTIBIOTIC PROTOCOL AND SURGERY

Patients were given a prophylactic dose of an antibiotic before and after surgery, and the choice of the antibiotic depended on the operating surgeon and any antibiotic allergy status disclosed preoperatively. The 3 antibiotic courses that could be used were cefazolin, clindamycin, or penicillin G. Patients treated with cefazolin received cefazolin 1 or 2 g, which was administered 30 minutes before surgery, followed by 3 postoperative doses every 8 hours. For patients with a penicillin allergy, clindamycin 600 mg was given 30 minutes before surgery, followed by 3 postoperative doses every 8 hours. Patients treated with penicillin G received penicillin G 2 million U 30 minutes before surgery, followed by 4 doses every 6 hours after surgery.

One staff oral and maxillofacial surgeon and the surgeon's resident performed all surgical procedures. All surgical sites were prepared with a 10% betadine solution before surgery. Patients also received Solu-Medrol 1 g at the start of surgery unless contraindicated by medical history. Le Fort osteotomies were performed using a reciprocating saw and the maxilla was segmented, if required. Fixation of the maxilla was obtained with wires with or without titanium miniplates. BSSO fixation was obtained using titanium miniplates. FG fixation was obtained with wires, titanium miniplates, or bicortical screws. Third molars were removed at the time of surgery, if indicated by the patients' treatment plan. All patients remained in intermaxillary fixation after surgery for a minimum of 2 weeks. All patients were in the hospital after surgery for a minimum of 1 day with the exception of some patients who received only an FG, who were discharged on the same day. Patients, once discharged, were given oral hygiene instructions and a 2-week supply of 0.12% chlorhexidine rinse to be used twice daily.

Patients were seen by their surgeon at 2 and 4 weeks after surgery to assess recovery status. Patients who developed an SSI were prescribed antibiotics, with the surgeon determining the type and regimen of the antibiotic. Patients were followed closely until resolution of the infection.

DIAGNOSIS AND MANAGEMENT OF SSIS

The diagnosis of a SSI followed the criteria of the Centers for Disease Control and Prevention and therefore was based on the presence of pain, swelling, purulence, fistula(s), or dehiscence, which resulted in the need for antibiotic treatment.[1] Sometimes none of these findings was reported, but instead only the surgeon's diagnosis of the infection and the prescribed antibiotic treatment were recorded in the chart. Then, the prevalence of SSIs was determined for each group and used for statistical analysis. For patients who developed an SSI, charts were retrieved and assessed for days after surgery at which the SSI was identified, the antibiotic(s) prescribed for the treatment of the SSI, the location of the infection, the signs and symptoms of the infection, recurrence of infections, and removal of hardware. Chart analysis of these patients was performed at a minimum of 6 months from the date of their surgery.

STATISTICAL ANALYSIS

All raw data was entered into Excel (2010; Microsoft, Redmond, WA). For statistical analysis, patients were divided into groups according to the antibiotic that they received for prophylaxis: gender, medical status, smoking status, duration of surgery, third molars extracted, bimaxillary surgery, and type of surgery (Le Fort only, BSSO only, FG only, Le Fort and BSSO, Le Fort and BSSO and FG, Le Fort and FG, or BSSO and FG). A χ^2 analysis with a 2-tailed P value, 1 of freedom, and Yates correction compared these categorical variables against the prevalence of infection to determine meaningful relations. Age and duration of surgery, being continuous variables, were compared against the prevalence of infection using binary logistic regression analyses to determine any meaningful associations. All statistical tests considered a P value less than .05 to be significant. SPSS (SPSS, Inc, Chicago, IL) was used for calculations. A statistician at the Nova Scotia Health Authority reviewed the statistics.

Results

PATIENT DEMOGRAPHICS WERE NOT ASSOCIATED WITH INCREASED RISK OF INFECTION

In total, 2,521 orthognathic cases were performed from October 2005 through April 2013, and 253 patient charts were excluded because of insufficient data or they could not be found. Therefore, the data of 2,268 patients were reviewed (mean $\pm$ standard deviation, 26.9 ± 11.7 yr of age). In total, 182 SSIs (8%) were documented. Age was not significantly associated with an increased prevalence of SSI (odds ratio = 0.9987; 95% confidence interval [CI], 0.9857 to 1.0119; P = .846). There was a higher female than male prevalence in the overall sample (with and without SSI) and the group of patients with SSIs (Table 1). Gender did not pose an increased risk for SSI (P = .05). The following trend in prevalence of medical history classifications was evident in the overall sample (with and without SSI) and only those patients with SSIs: class 1 > class 2 > class 3. Many of the class 3 conditions noted were autoimmune and cancerous diseases and smoking. Of the few health conditions noted in the group of patients with SSIs, only 2.8% were comorbidities that directly affected infection. There was no significant correlation with infection for patients in class 1, 2, or 3 (P = .15, .34, and .41, respectively). The prevalence of nonsmokers was greater than that of smokers in the overall sample (with and without SSI) and only those patients with SSIs. Smoking status did not significantly affect the prevalence of SSIs (P = .30).

CHART SCREENING AND SSI ANALYSIS

The charts of 79% of patients with SSIs met the criteria for detailed review, where 21% were lost to follow-up or had insufficient data (Fig 1). Most initial infections (62%) and recurrent infections (78%) occurred in the mandible. Refixation or nonunion occurred in 17 patients (0.8%). Readmission for severe nausea or vomiting or dehydration occurred in 25 patients (1.1%). Severe nosebleed requiring intervention was seen in 11 patients (0.5%). Inferior alveolar nerve transection occurred in 6 patients (0.3%). The most common antibiotic prescribed for SSIs was clindamycin 300 or 450 mg 4 times per day, followed by penicillin 600 mg 4 times per day, with or without metronidazole 500 mg twice per day. Twenty-six percent of patients who developed SSIs had recurrent infections after antibiotic treatment, and 14% of patients with SSIs required hardware removal from the surgical site. Negative side effects from antibiotics were reported in 4.2% of patients, which included nausea, vomiting, and rash. No cases of *Clostridium difficile* infection were reported.

Table 1. DEMOGRAPHICS OF PATIENTS WITH ASSOCIATED PREVALENCE OF THE TOTAL SAMPLE AND OF THOSE WITH SSIS

	Prevalence (%)*		
Demographics	No SSI	SSI (All Patients/Only Patients With SSI)	P Value†
Gender			
Men	796 (35)	82 (3.6/45)	
Women	1,471 (65)	100 (4.4/55)	.05
Medical history‡			
Class 1	1,330 (59)	105 (4.6/58)	.15
Class 2	424 (19)	42 (1.9/23)	.34
Class 3	333 (15)	33 (1.5/18)	.41
Smoking			
Nonsmokers	1,808 (80)	151 (6.7/83)	
Smokers	279 (12)	29 (1.3/16)	.30

Abbreviation: SSI, surgical site infection.

* Total number of patients in the study was 2,268 and the number of only those with SSI was 182.

† The χ^2 test was used to compare the relation between the given demographic and mean SSI prevalence (8.0%).

‡ Class 1, healthy; class 2, condition that does not increase the risk of infection; class 3, condition that does increase the risk of infection.

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SURGERY LENGTH AND BIMAXILLARY SURGERY INCREASED THE PREVALENCE OF SSI

The average length of surgery for patients who did not have an SSI was 136 minutes compared with an average of 157 minutes for patients who had an SSI, and this difference was significant (odds ratio = 1.0051; 95% CI, 1.0026 to 1.0076; P < .001). Wisdom teeth were extracted in 49.6% of patients, and extractions did not affect the prevalence of infection (P = .052). The mean SSI prevalence for multiple jaw procedures (9.2%) was significantly greater than that of single surgical procedures (5.3%; P = .0013).

PATIENTS WHO UNDERWENT LE FORT ONLY SURGERY HAD A MARKEDLY LOWER PREVALENCE OF SSI

The prevalence of infection ranged from 3.5% in patients receiving only Le Fort surgeries to 11.5% in patients receiving the BSSO and FG combination of surgeries (Table 2). The patients receiving only a Le Fort surgery had a significantly lower prevalence of infection compared with the overall prevalence (P = .02). There was no significant difference between the prevalence of infection in 1-piece and segmental Le Fort osteotomies (P = .98). The prevalence of infection in all other types of surgeries was not markedly different from the overall prevalence of infection.

PATIENTS TAKING CEFAZOLIN HAD THE LOWEST PREVALENCE OF INFECTION

Patients who received cefazolin for antibiotic prophylaxis had a significantly lower prevalence of SSI compared with the overall prevalence (P = .03; Table 3) and with patients who received penicillin and clindamycin (P < .0001 and P < .02, respectively).

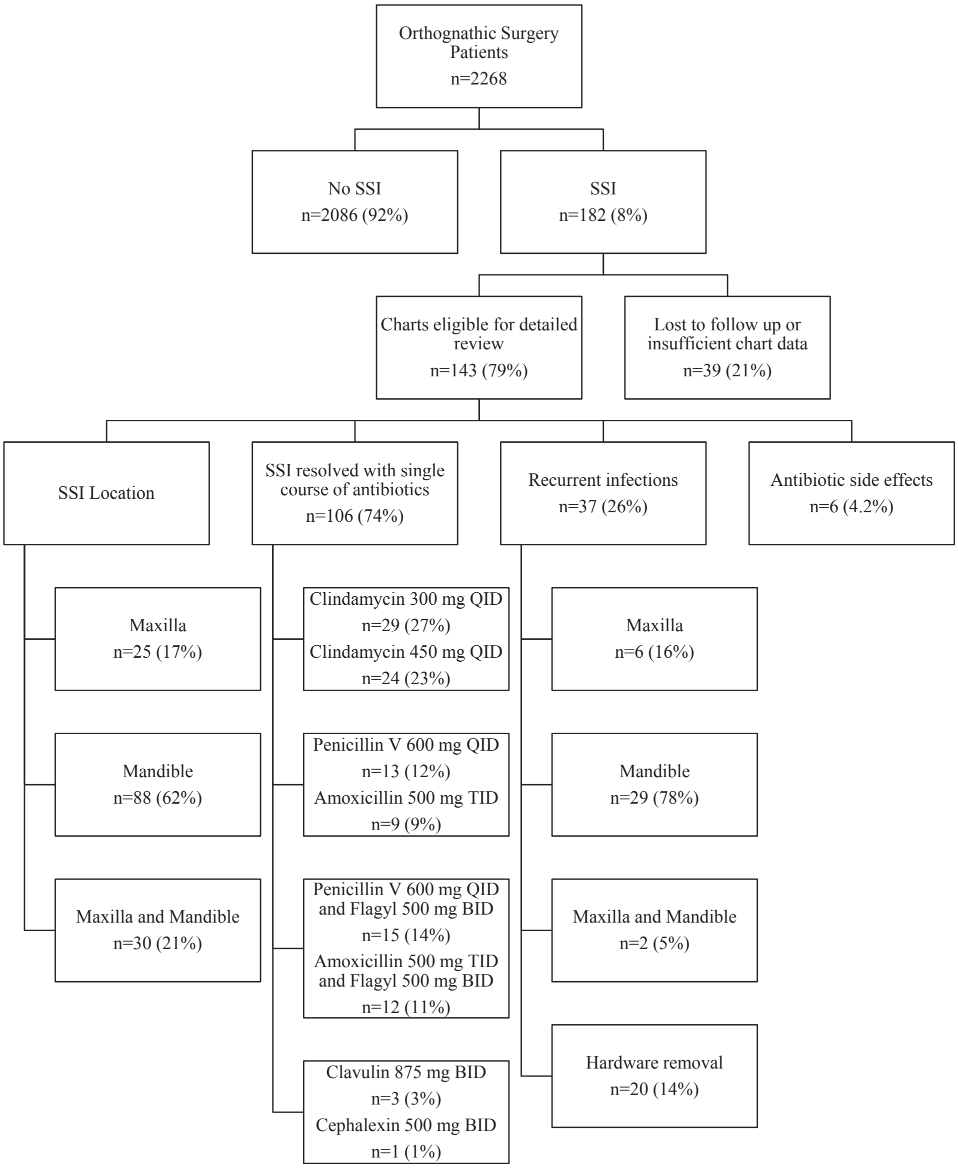

FIGURE 1. Chart screening and SSI analysis. SSIs were analyzed for surgical site location, antibiotic treatment rendered, presence of recurrent infections, and presence of side effects from the study antibiotics. BID, 2 times per day; QID, 4 time per day; SSIs, surgical site infections; TID, 3 times per day.

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Patients who received penicillin had a significantly higher prevalence of infection than the mean ($P <$ .0001). Patients who received clindamycin did not have a significant difference in SSI prevalence compared with the mean (P = .16). There was no statistical difference in SSI prevalence between the penicillin and clindamycin groups (P = .24).

Discussion

The evidence for the use of perioperative antibiotic prophylaxis is extensively studied throughout many surgical specialties and the benefits are quite clear. Maintaining proper antibiotic stewardship by using the most specific and appropriate antibiotic is important to minimize the risk of SSI, limit side effects to the patient, and lower costs to the health care system. Therefore, the primary goal of this study was to assess the prevalence of infection associated with the commonly used antibiotics for orthognathic surgery. Cefazolin was the most efficacious in decreasing the prevalence of SSIs.

The authors sought to determine the impact of patient demographics, including age, gender, medical comorbidities, and smoking statuses; duration of surgery; third molar extractions; bimaxillary surgery; and type of surgery on the prevalence of infection. No correlation was found between any of the patient

Table 2. SUMMARY OF PREVALENCE OF SURGICAL SITE INFECTIONS ASSOCIATED WITH THE SURGERY PERFORMED

Procedure	Total Patients	Infection, %	*P* Value*
BSSO	422	7.0	.70
Le Fort	254	3.9	.02†
1-Piece Le Fort	115	3.5	.11‡
Segmental Le Fort	139	4.3	.16‡
FG	33	6.1	.93
BSSO + FG	157	11.5	.17
Le Fort + FG	66	4.6	.42
BSSO + Le Fort	898	8.2	.90
BSSO + Le Fort + FG	418	10.5	.11
Total	2,268	8.0	—

Abbreviations: BSSO, bilateral sagittal split osteotomy; FG, functional genioplasty.

* Compares prevalence of infection for each type of surgery with mean prevalence (8.0%).

† Significantly different from the mean (8.0%) by χ^2 test.

‡ $P = .98$ by χ^2 test comparing 1-piece versus segmental Le Fort surgeries.

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demographics or third molar extractions and the prevalence of SSIs; a longer duration of surgery and having multiple jaws involved were associated with an increased prevalence of SSIs; and isolated Le Fort surgeries had a statistically lower SSI prevalence compared with the mean prevalence. Further investigation into antibiotic use and each surgical procedure could provide further insight into most ideal regimen, because the 2 groups were analyzed together in this study.

Many studies recommend the use of penicillin as the first-line antibiotic for orthognathic surgery in preventing SSIs.[3,5,12,14] Penicillin is the primary antibiotic of choice for resolving intraoral and dental infections.[15] This study shows that patients who received cefazolin prophylaxis had a statistically lower prevalence of infection than patients who received penicillin. The salivary concentrations of cefazolin and cephalexin have been found to be markedly greater than penicillin and amoxicillin.[16] In addition, patients treated with cefazolin had a lower prevalence of SSI than those treated with clindamycin. This difference could be due to the resistance of *Streptococcus* species to clindamycin, which can be as high as 17%.[17] The unit cost of cefazolin is approximately half that of penicillin and clindamycin.[18] This study suggests that the benefits of the added protection against SSIs when using cefazolin compared with clindamycin might be greater than the risks associated with a possible allergic reaction.

Table 3. SUMMARY OF PREVALENCE OF SURGICAL SITE INFECTIONS ASSOCIATED WITH THE ANTIBIOTIC USED

Antibiotic	Total Patients	Infection, %	*P* Value*
Cefazolin	1,627	6.2	.03†
Penicillin	371	14.3	<.0001†
Clindamycin	270	10.4	.16
Total	2,268	8.0	—

* Compares prevalence of infection for each type of antibiotic with the mean prevalence.

† Significantly different from the mean (8.0%) by χ^2 test.

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Patient demographics, such as age and gender, have been identified as possible risk factors for SSIs.[12] However, in this study, neither of these variables was meaningfully linked to an increased risk of infection. These results corroborate those obtained by Chow et al[12] who performed a 15-year retrospective study and found no connection between age or gender and SSIs.

The medical histories of the patients in this study reflected the relatively young average age. Most patients were healthy or had a condition that did not affect their immune function. For those who did have a condition that caused immunosuppression, there was no meaningful increase in the prevalence of SSIs. This can be attributed to the fact that these patients represented only a small portion of the overall sample. Likewise, smoking did not substantially increase the prevalence of SSIs, although smoking has a well-documented connection to an increased risk of infection.[11] To properly assess the impact of medical history and smoking on the prevalence of SSIs, studies that include patients exclusively with these conditions need to be performed.

The anatomic differences between the maxilla and mandible can create differences in the susceptibility to infection in each of these areas. First, the mandible is less vascular than the maxilla.[13] Second, gravitational forces cause bacteria-rich saliva and food to pool in the mandible along surgical incisions. This saliva and food cannot be cleared easily during intermaxillary fixation and therefore can pool for extensive periods. The surgical incisions take up to 3 days to heal, and during this time bacteria can freely enter the surgical sites.[13] These anatomic differences could explain the results, because patients undergoing only Le Fort surgeries had a considerably lower prevalence of SSI compared with the overall prevalence of SSI. In contrast, the prevalence of SSI in all other types of surgeries, which included the mandible, was not substantially different from the mean prevalence of SSI. A notable number of cases in this study required hardware removal from the mandible because of SSI, which necessitates another surgery, further costs and antibiotic use, and increased patient morbidity. Therefore, surgeries involving the mandible could benefit from a more rigorous antibiotic regimen for the prevention of SSIs.

Dual-jaw deformities that require upper and lower jaw surgeries can increase the risk of SSI. Dual-jaw deformities were present in 68% of patients, which is similar to the 65% reported by Chow et al.[12] Not surprisingly, this investigation found the prevalence of infection was lower with single-jaw surgery compared with multiple procedures. This is in contrast to those results found by Alpha et al,[19] in which a lower prevalence of infection was seen for BSSOs with adjuvant procedures. In that study, patients who received multiple procedures remained in the hospital and received intravenous antibiotics during their admission, which are given over a longer duration than oral antibiotics. This was in contrast to patients who underwent only a BSSO, who received oral antibiotics because they were discharged home the same day.[19] These differences in antibiotic duration and method of administration could have affected the prevalence of SSI seen in their patient cohort. In this study, the same duration of antibiotics was used for all patients, with the exception of some patients who only had a FG (who were discharged the same day). In addition, surgeon preference and drug allergy status of the patient were the main factors leading to choice of antibiotic used.

The literature varies with respect to the association between length of surgery and SSIs.[11,12] This study found an important association between surgical duration and SSIs; however, the difference in mean duration between the SSI and non-SSI groups was only 21 minutes. This is a short period compared with the overall length of an orthognathic surgery and theoretically should not have created any notable increase in risk of infection for the SSI versus non-SSI group.

Third molar extractions have been identified as a possible risk factor for SSIs.[11] This study did not find a meaningful association between extractions and prevalence of SSIs. Doucet et al[20] found that extracting third molars during orthognathic surgery did not increase the risk of complications and avoided additional surgical procedures, associated morbidities, and additional costs to the patient and the health care system.

The diagnostic criteria for SSIs vary immensely among studies. The criteria used in this study included swelling, pain, purulent drainage, dehiscence, and surgeon diagnosis alone. Ultimately, the primary measurable factor from a chart review was the surgeons' decision to treat the signs and symptoms of an infection. Unless cultures are obtained, one cannot be certain that an SSI was the absolute cause of the symptoms. Orthognathic patients in particular present a major challenge in obtaining adequate cultures, because the location of the surgery is within the oral cavity. The oral microflora can contaminate samples retrieved from the surgical sites, which complicates the interpretation of the cultures. This can be avoided by obtaining sterile samples from an extraoral approach or obtaining tissue samples; however, these approaches are impractical.

Antibiotic side effects warrant additional caution in prescribing these drugs. The common side effects of antibiotics are nausea, vomiting, and rash. Furthermore, antibiotics, especially clindamycin, pose an increased risk of infection by *C difficile*.[21] Overall, the amount of antibiotic side effects reported in this study was low, and no cases of *C difficile* were reported. Therefore, extending the length of postoperative antibiotic coverage might not pose any serious risks to patients.

This study reported only those infections that were recorded in the progress notes of the charts. This explains why the average number of days after surgery that SSIs were diagnosed corresponded to the routine 2-week follow-up. When implantable hardware is used at the time of surgery, an infection that develops in that location is considered a result of the procedure until 1 year after surgery.[1] As a result, this study might have underestimated the true prevalence of infections that the patients might have developed as a result of the surgery.

Some aspects of this study disallowed the assessment of some variables that have been associated with an increased risk of infection. First, the nature of a retrospective study limits the data gathered to what is recorded in the patients' charts, and therefore factors that could affect SSI and other information might not have been included.[20] Second, different types of fixation can affect the prevalence of infection.[22] Only 1 method of fixation was used routinely; therefore, it was not possible to assess the effect of fixation on the prevalence of SSI.

This retrospective study suggests that cefazolin is the antibiotic of choice for prophylaxis in orthognathic surgery, because the prevalence of SSI when using the regimen of cefazolin was lower than when using penicillin and clindamycin. There is still debate in the literature as to the ideal period that orthognathic patients should receive antibiotics in the postoperative period, with some studies advocating 1 day and others recommending an extended regimen.[23-25] A Cochrane review on antibiotics and SSI in orthognathic surgery showed a decreased risk of SSI with long-term antibiotics.[25] Comparing SSIs across centers is very difficult because of diagnostic criteria and local factors contributing to SSIs, in addition to the use of different antibiotics among studies.[26] Small variations between criteria can lead to a large variation in the reported rate of SSI.[26] The benefit of extending prophylactic antibiotics beyond 48 hours must be closely investigated because extended regimens can select for more resistant bacteria.[15] Furthermore, this study suggests that a more rigorous regimen might be necessary based on the type, location, and duration of surgery and the number of jaws involved. In addition, the patients' age, gender, and medical and smoking statuses and third molar extractions might not pose an increased risk of infection. Prospective randomized controlled clinical trials are required to confirm the most appropriate antimicrobial agent, the length of coverage required, and the effects of other patient and surgical variables on the prevalence of infection.

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