The absence of prophylactic antibiotics administration and the surgical site infection rate in Mohs micrographic surgery

Riva Ambardina Pradita, Larisa Paramitha Wibawa

Department of Dermatology and Venereology, Faculty of Medicine, Universitas Indonesia, dr. Cipto Mangunkusumo National Central General Hospital, Jakarta, Indonesia

Email: rivaambardina@gmail.com, wibawalarisa@yahoo.co.id

Abstract

Background: The use of prophylactic antibiotics in dermatologic surgery, particularly in Mohs micrographic surgery (MMS), remains a gray area. Despite the low rate of surgical site infection (SSI), SSI can result in some significant morbidities. Thus, numerous dermatologists keep administering prophylactic antibiotics in MMS.

Method: A search was conducted to identify clinically significant topics followed by literature review through the main available medical literature database. The three selected studies that met the inclusion and exclusion criteria were then critically assessed for their validity, importance, and applicability using the guidance from Centre for Evidence-Based Medicine for Critical Appraisal of Prognostic Studies.

Results: Three articles showed a low SSI rate with a narrow confidence interval (CI): 0.91% (95% CI: 0.38–1.45%), 0.7% (95% CI: 0.21–1.19%), and 0.72% (95% CI: 0.5–0.9%).

Conclusion: Based on the available studies, we conclude that the absence of prophylactic antibiotics is not related to the SSI incidence.

Keywords: Mohs micrographic surgery, antibiotic, infection

Background

Mohs micrographic surgery (MMS) is considered a clean dermatologic procedure. Coupled with evidence in the literature, the statistics shows a low surgical site infection (SSI) incidence in clean dermatologic surgery; thus, prophylactic antibiotics are occasionally not used. Despite of this, numerous dermatologic surgeons keep administering prophylactic antibiotics as routine precaution without rational consideration due to the fear of the significant morbidity caused by SSI. The use of prophylactic antibiotics to prevent SSI remains controversial. In the light of this issue, an evidence-based case report was carried out to provide confirmative evidence whether prophylactic antibiotics used prior to MMS would significantly reduce the incidence of SSI or not.

Case illustration

A 75-year-old man with no significant medical history presented with a slow-growing hyperpigmented nodule on his right nasal ala since 1.5 years ago. The tumor size was 190 mm x 140 mm with circumscribed rolled border corresponding to a basal cell carcinoma. Laboratory test results for complete blood count, glucose, and coagulation tests were within normal limit. Two-stage MMS was performed on the patient with dorsal nasal flap reconstruction; the operation lasted for 4.5 hours. The lesion was covered with three layers of sterile cotton gauzes and fixated with paper tape between stages. The procedure resulted in a defect measured 700 mm x 300 mm. The clinician questioned whether the absence of prophylactic antibiotics would increase the SSI incidence in a typical MMS scenario without any risk factor.
Clinical question

In patients undergoing MMS, the prognosis for developing SSI without prior prophylactic antibiotics must be determined.

Using the patient/problem, intervention, comparison, and outcome[s] of interest (PICO), this problem was broken down as follows:

- **P** = Patient undergoing MMS
- **I** = No prophylactic AB
- **C** = No comparison
- **O** = Prognosis for SSI

Methods

Article search

The search for relevant articles was performed on the PubMed, Science Direct, and Clinical Key databases on April 10th, 2017 (Table 1).

Article selection

Article selection was based on the inclusion and exclusion criteria. Manual search of the references section of electronically identified articles was also performed. Our search strategy, inclusion and exclusion criteria, and the results are presented in the flowchart (Figure 1).

Table 1. Literature search strategy

<table>
<thead>
<tr>
<th>Database</th>
<th>Search Strategy</th>
<th>Hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PubMed</td>
<td>Mohs OR dermatologic surgery AND (prophylactic OR prophylaxis) AND (antibiotic) AND (infection)</td>
<td>2024</td>
</tr>
<tr>
<td>Science Direct</td>
<td>Mohs OR dermatologic surgery AND prophylactic OR prophylaxis OR antibiotic AND infection</td>
<td>825</td>
</tr>
<tr>
<td>Clinical Key</td>
<td>Mohs OR dermatologic surgery AND prophylactic OR prophylaxis OR antibiotic AND infection</td>
<td>33</td>
</tr>
</tbody>
</table>
Inclusion criteria:
- Patient undergoing MMS
- Without the use of prophylactic antibiotic
- Cohort study

Exclusion criteria:
- Reported in a language other than English
- Animal study
- Patient with heart valve or recent prosthetic joint surgery
- Follow-up performed > 30 days postoperatively

Figure 1. Flow chart of literature search
### Table 2. Study characteristics

<table>
<thead>
<tr>
<th>Article (year)</th>
<th>Study design</th>
<th>Domain</th>
<th>Number of Patients</th>
<th>Determinant</th>
<th>Outcome</th>
<th>Follow-up period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rogers et al. (2009)</td>
<td>Prospective case series</td>
<td>Patients underwent MMS</td>
<td>1000</td>
<td>No use of prophylactic antibiotics</td>
<td>SSI</td>
<td>Between 5 and 14 days postoperatively</td>
</tr>
<tr>
<td>Maragh et al. (2005)</td>
<td>Prospective case series</td>
<td>Patients underwent MMS</td>
<td>1000</td>
<td>No use of prophylactic antibiotics</td>
<td>SSI</td>
<td>1st and 4th week postoperatively</td>
</tr>
<tr>
<td>Alam et al. (2012)</td>
<td>Inception cohort</td>
<td>Patients underwent MMS</td>
<td>8300</td>
<td>No use of prophylactic antibiotics</td>
<td>SSI</td>
<td>24-h until 1 month postoperatively</td>
</tr>
</tbody>
</table>

### Table 3. Critical appraisal

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Validity</th>
<th>Importance</th>
<th>Applicability*</th>
<th>LoE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Article (year)</td>
<td>Sample definition, representative, same baseline</td>
<td>Sufficient follow-up time</td>
<td>Blinded Outcome</td>
<td>Prognostic factor adjustment</td>
</tr>
<tr>
<td>Rogers et al. (2009)</td>
<td>+</td>
<td>+</td>
<td>N/A</td>
<td>-</td>
</tr>
<tr>
<td>Maragh et al. (2005)</td>
<td>+</td>
<td>+</td>
<td>N/A</td>
<td>-</td>
</tr>
<tr>
<td>Alam et al. (2012)</td>
<td>+</td>
<td>+</td>
<td>N/A</td>
<td>+</td>
</tr>
</tbody>
</table>

+: appropriate  
-: not appropriate  
CI: confidence interval  
* Applicability criteria are shown in Table 4  
N/A: not applicable  
LoE: Level of evidence
patients developed SSI, confirming that SSI is exceedingly rare and accentuates the safety of performing clean MMS technique in the outpatient setting without the use of prophylaxis antibiotics. The limitation of this study is that it is a single-institution prospective uncontrolled research.7

Another study was conducted by Maragh et al.6 at a tertiary teaching hospital in New York. Similar to the work of Rogers et al.7, this research was a single-institution prospective uncontrolled study. The overall wound infection rate was 0.7% (95% CI: 0.21%–1.19%).6 Maragh et al.6 presented the prognostic factors based on the tumor site, closure type, and stage required despite the lack of adjustment for important prognostic factors. Of the MMSs performed, the infection rates involving the nose, flap closures, and multistage procedures were 1.7%, 2.4%, and 0.8%, respectively; these numbers were exceedingly low and in contrary with the general belief.6

The study by Alam et al.8 was a multicenter prospective inception cohort study involving 21 private and 2 referral centers for MMS from different geographic locations in the United States. Alam et al.8 evaluated several major adverse events associated with MMS, one of which was SSI. Among the 8300 patients who underwent procedures without prophylactic antibiotics, 83 were reported to develop SSI at a rate of 0.72% (95% CI: 0.5%–0.9%). Although the use of prophylactic antibiotics may reduce SSI, given the absolute risk reduction for each type of procedure at 0.52% (p < 0.001), it only provides small-scale clinical benefits in infection reduction. In the context of cost-benefit analysis, Alam et al.8 argued that the expense of therapeutic oral antibiotics in event of SSI would cost considerably more than preventing a single infection.
Conclusion

Based on the publications appraised in this evidence-based case report, the absence of prophylactic antibiotics in MMS is not a significant cause of SSI. The use of prophylactic antibiotics in our MMS protocols requires further evaluation. Further studies should examine the other risk factors for SSI based on patient, tumor characteristics, and surgery techniques, all of which have not been studied in combination.

Acknowledgments

The authors reported no conflict of interest, and no funding was received for this work. This article had won 1st prize winner of Evidence-Based Case Report Competition (2018) by Clinical Epidemiology and Evidence-Based Medicine, Faculty of Medicine, Universitas Indonesia, Dr. Cipto Mangunkusumo Hospital.

References