RESEARCH LETTER

Incidence of Keloid and Risk Factors Following Head and Neck Surgery

Keloids are benign tumors of unknown pathogenesis. They extend beyond the boundaries of injury, rarely regress, and are often painful, pruritic, and erythematous. Keloid incidences have been reported as high as 16%, especially in patients of African descent. The risk of keloid development following head and neck surgery is not well known, and better data would aid surgeons in obtaining fully informed consent from their patients. We undertook a retrospective study to determine risk factors and incidence of keloid formation following head and neck surgery at our urban tertiary care center. To our knowledge, no similar studies exist in the literature.

Methods | This retrospective study was approved by the Henry Ford Health System institutional review board. We searched the databases of the Henry Ford Health System and Health Alliance Plan (HAP) to identify patients who had undergone surgery requiring skin incisions in the head or neck from 2005 to 2009 and who had a minimum of 1-year continuous enrollment in HAP following surgery. Using International Classification of Diseases, Ninth Revision code 701.4 and medical chart review, we confirmed the diagnosis of keloid and noted its location and the demographic characteristics of the patient.

We used the Fisher exact test for univariate analysis of independent associations between the incidence of keloid formation and age, sex, and race. Frequencies and rates were reported across age groups (0-19, 20-39, 40-59, and ≥60 years). We used multiple logistic regression analysis evaluate each demographic characteristic in relation to the incidence of keloid. Odds ratios (ORs) and 95% confidence intervals (CIs) were considered significant at \( P < .05 \).

Results | Of the 6691 patients who met selection criteria, 20 had a keloid. As detailed in the Table, the 0.8% incidence rate of keloids for African Americans was significantly higher than the 0.1% rate for whites and the 0.2% rate for other race (\( P = .003 \)). Men and women were affected equally (0.3% vs. 0.2%). The rates of 0.5% and 0.6% for ages 0 to 19 years and 20 to 39 years, respectively, were significantly higher than the rates of 0.2% and 0.1% for ages 40 to 59 years and 60 years or older (\( P = .03 \)). In general, patients with keloids on the head or neck were significantly younger than patients without a keloid (\( P = .02 \)).

When controlling for age and sex, we found a statistically significant association between race and incidence of keloid (\( P = .001 \)). Among African Americans, the odds of developing a keloid were 7.1 times that of whites (OR, 7.1; 95% CI, 2.3-20.0). However, after accounting for sex and age, we no longer found a statistically significant association between age and keloid development or between sex and keloid development.

Discussion | A wide range of incidences for keloid development has been reported, including 4.5% to 16.0% for African Americans and Hispanics. Our study found lower rates of 0.1% to 0.8% following head and neck surgery, suggesting that the inclusion of data from other sites or ear piercings may overestimate the rates in head and neck surgery. The reason for anatomic variations is unknown.

The lowest rates of keloid formation are in albinos, and the highest are in those with darker skin. Our study corroborated this finding with African American patients, who experienced a 7.1 times increased incidence of keloid formation fol-

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No Keloid (n = 6671)</th>
<th>Keloid (n = 20)</th>
<th>( P ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD), y</td>
<td>42.7 (22.5)</td>
<td>31.1 (19.4)</td>
<td>.02</td>
</tr>
<tr>
<td>Age group, y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-19</td>
<td>1537 (99.5)</td>
<td>8 (0.5)</td>
<td>.03</td>
</tr>
<tr>
<td>20-39</td>
<td>966 (99.4)</td>
<td>6 (0.6)</td>
<td></td>
</tr>
<tr>
<td>40-59</td>
<td>2581 (99.8)</td>
<td>4 (0.2)</td>
<td></td>
</tr>
<tr>
<td>≥60</td>
<td>1586 (99.9)</td>
<td>2 (0.1)</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Black</td>
<td>1818 (99.2)</td>
<td>15 (0.8)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>4244 (99.9)</td>
<td>4 (0.1)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>609 (99.8)</td>
<td>1 (0.2)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td>.82</td>
</tr>
<tr>
<td>Female</td>
<td>3386 (99.7)</td>
<td>11 (0.3)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3285 (99.7)</td>
<td>9 (0.3)</td>
<td></td>
</tr>
</tbody>
</table>

*Unless otherwise noted, data are reported as number (row percentage) of patients.
lowing head and neck surgery compared with white patients. The reason for the race predilection is unknown, but it may be related to the thicker, more seborrheic skin in African Americans.³

Age is also a reported factor in keloid development, with persons aged 11 to 30 years at greatest risk.⁴ Patients with keloids were generally younger in our study (P = .03).

The overall incidence of keloid development on the head or neck for both whites (0.1%) and African Americans (0.8%) was much lower in our study than in other reports.²,⁴,⁵ This rate is inherently influenced by the identification and coding of keloids by physicians or data extraction during the retrospective review as well as duration of patient follow-up, which are limitations of our study. Another limitation of our study is the small number of patients with keloids to compare.

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Conflict of Interest Disclosures: None reported.
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Author Contributions: Dr Jones had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Worsham, Joseph, Jones.

Acquisition, analysis, or interpretation of data: Young, Worsham, Joseph, Divine, Jones.

Drafting of the manuscript: Young, Worsham, Joseph, Jones.

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Statistical analysis: Divine, Jones.

Obtained funding: Joseph.

Administrative, technical, or material support: Worsham, Jones.

Study supervision: Jones.

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