Effect of Time Delays to Mohs Micrographic Surgery on Surgical Outcomes in Keratinocyte Carcinoma

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BACKGROUND

- Estimated annual incidence of keratinocyte carcinoma (KC), including basal cell (BCC) and squamous cell carcinoma (SCC), is 5.4 million, with a total of 3.3 million people impacted[1,2]
- Incidence of KC continues to rise, with a 35% increase observed from 2006-2012[2]
- Due to low metastatic potential, KC treatment typically focuses on local control including Mohs micrographic surgery (MMS), surgical excision, electrodessication and curettage (ED&C), and topical chemotherapy[3]
- MMS is indicated with recurrent tumors, areas where tissue sparing is paramount, tumors in high-risk areas (periauricular, canthi, pinna, and lip), aggressive tumors, immunocompromised patients, and other high risk tumors[4]
- MMS is time- and labor-intensive, often contributing to long wait times, which has been exacerbated by COVID-19[5,6]
- The clinical significance of long wait times is relatively unknown[3]

OBJECTIVE

- To examine the effect of time from initial biopsy to MMS on surgical outcomes in keratinocyte carcinoma
- Difference in area was used as the main surrogate for clinical outcomes and tumor growth

METHODS

Study Design

- Retrospective, single-center study; IRB approved
- Data pulled from prospectively collected surgical database of all cases of MMS, with chart review used for additional information
- Two surrogates of clinical size of initial tumor were utilized – size of gross pathology specimen and clinical measurements (cm)
- Gross and clinical difference in area (cm^2) calculated as difference between size of final surgical defect and two surrogates of clinical size
- Treatment delay defined as time, in days, from date of initial biopsy to date of MMS

Patients

- All patients treated with MMS for BCC and SCC from January 1, 2016 to December 31, 2016 were identified
- 2088 individual cases of BCC, SCC, and SCC in situ (SCCis) treated with MMS were retrospectively identified, of which 137 were excluded due to recurrent tumors, treatment delay greater than one year, incomplete or duplicate documentation

Statistical Analysis

- Univariate logistic regression performed to analyze relationship between time since biopsy and area difference within subgroups based on patient demographics and clinical factors

RESULTS

- For BCC, there was no correlation between difference in area and time elapsed since biopsy for area for either size estimate (n=1207, gross p-value=0.29; clinical p-value=0.69), and similarly for invasive SCC (n=426, gross p-value=0.93; clinical p-value=0.66)
- No statistically significant association was found between area difference and time within demographic subgroups of age (≥65, <65), gender (male, female), and smoking status (smoker, non-smoker) ($r < 0.05$, $r^2 < 0.0025$)
- Increase in area difference with longer wait times was not observed in patients with a history of transplant (Figure 1)

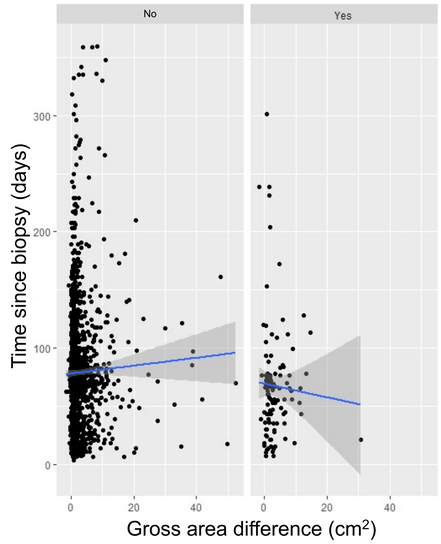

Figure 1. Regression analysis of time since biopsy and gross area difference evaluating patients with history of transplant (yes vs. no)

- There was no association when analyzed by histological subtypes of BCC, SCC, or SCCis ($r < 0.05$, $r^2 < 0.0025$)
- An analysis was performed examining tumors in the following locations: ear, face, foot, groin, hand, lip, lower extremity, neck, nose, scalp, trunk, and upper extremity (Figure 2)
  - No statistically significant correlation between area and time was found for most locations ($r < 0.05$, $r^2 < 0.0025$)
  - A very weak positive association was found for facial location and very weak negative association for location on the ear (Table 1)

Table 1. Regression coefficients of relationship between area difference and time for tumor locations on the ear and face

Location	r value	r^2 value
Ear	-0.178	0.032
Face	0.094	0.009

RESULTS (cont.)

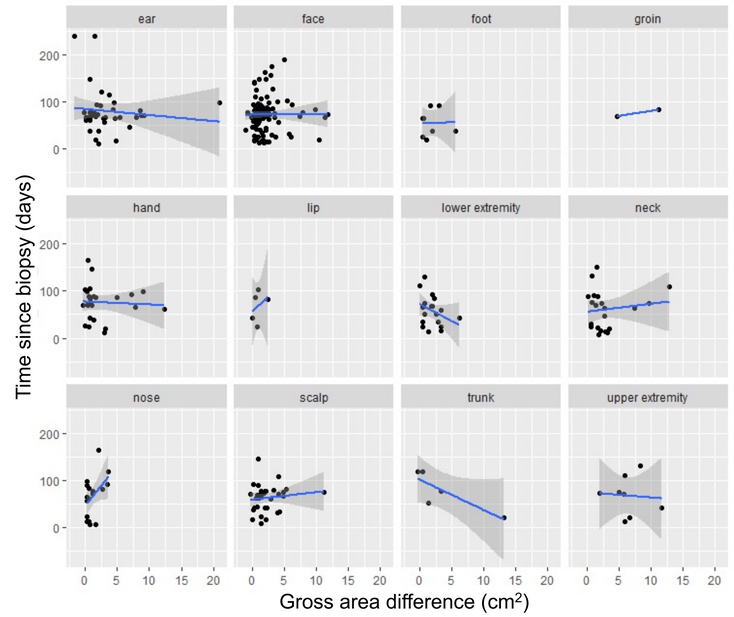

Figure 2. Regression analysis of time since biopsy and gross area difference of groups delineated by tumor location

- There was no significant correlation between time since biopsy and number of MMS stages or between time and closure method ($r < 0.05$, $r^2 < 0.0025$)

CONCLUSION

- For BCC, SCC, and SCCis treated within one year of biopsy, there was no correlation between area difference of biopsy versus surgical defect and time since biopsy
- Further analysis of groups based on gender, age, smoking status, transplant history, histologic subtypes, and most tumor locations did not find any positive associations
- No identified time at which delayed treatment affected clinical outcomes
- Limitations: Retrospective nature led to reliance on recorded sizes which may be incomplete or inaccurate; unable to examine implications of treatment delay beyond a year given rarity of such samples in our cohort; data limited to single academic center

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