Letter to the Editor

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Impact of COVID-19 on melanoma diagnosis

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Melanoma, the leading cause of death from skin cancer, has a strong propensity for rapid local growth and distant spread unless diagnosed and removed promptly [1]. Efforts to curb the transmission of SARS-CoV-2 in the New York City metropolitan area during the spring of 2020 resulted in widespread disruptions to medical practices, including the provision of routine dermatologic care. We sought to examine the impact of the pandemic and the attendant regional lockdown on melanoma diagnoses rendered by our dermatopathology section, which provides diagnostic services to 250 clinicians from approximately 50 dermatology and other medical practices within our hospital system and the surrounding community. We compared the histopathological characteristics of melanomas diagnosed immediately following the first regional lockdown to those during the same time period in the preceding 5 years.

After Institutional Review Board approval, we reviewed our dermatopathology database for *in situ* and invasive melanomas diagnosed each year between 1 June and 15 August 15, from 2015 to 2020. This period was chosen because there was a significant reduction in total specimens received in April and May of 2020, coinciding with the closure of many medical offices during the early phase of the COVID-19 pandemic, and the total number of specimens submitted to our laboratory between 1 June and 15 August 2020 returned to normal levels. Recurrent melanomas, metastatic melanoma, re-excision of previously diagnosed melanomas, lesions with nondefinitive diagnoses and consultation cases were excluded. Patient age, gender, anatomic site, tumor thickness, ulceration, mitotic rate, perineural/lymphovascular invasion, regression, nodular growth pattern and transection of the specimen were recorded. Two-tailed tests for proportions and Fisher's exact test were performed on categorical data. Continuous data (age and tumor thickness) were treated with a comparison of means using Student's *t*-test. Statistical analysis was performed using Intercooled Stata 11.0 (Stata Corp, College Station, Texas, USA). *P* values <0.05 were considered significant.

One hundred two melanomas were diagnosed during the specified time period in 2020 and an average of 106 melanomas was diagnosed during the same calendar months from 2015 to 2019. There were no statistically significant differences between the pre- and postlockdown periods with respect to the percentage of melanomas among all dermatopathology cases received. Among the melanoma cases, there were no statistically significant differences between the periods with regard to patient age, gender, anatomical location of the melanomas, the proportion of invasive melanomas, mitotic rates, regression, or perineural/lymphovascular invasion or rates of transaction.

Invasive melanomas diagnosed following the regional lockdown had significantly greater average tumor thickness (mean 2.04 mm; SD 4.2 mm; median 0.6) compared to those diagnosed in prior years (mean 0.788 mm; SD 1.15; median 0.50) ($P=0.002$). There were also several very thick melanomas in 2020, which were rarely seen in any of the preceding 5 years (Fig. 1). The rates of ulceration were significantly increased (6 vs. 17% in pre- vs. postpeak years, respectively, $P=0.004$) and nodular melanomas represented a significantly larger proportion of the invasive melanomas diagnosed in 2020 compared to prepandemic years (30 vs. 13.8%; $P=0.002$) (Table 1). As a result of the increased tumor thicknesses and rates of ulceration, we saw a migration to a more advanced tumor stage at diagnosis (Table 1).

In conclusion, we observed significant increases in melanoma tumor thickness and ulceration, resulting in a greater proportion of melanomas being diagnosed at more advanced T stages, in the period immediately following the COVID-19 regional lockdown in the New York City metropolitan area. These findings may be the result of delays in diagnosis due to the disruptions in routine dermatologic care during the acute phase of the pandemic. Because the observed increases in tumor thickness were similar in males and females, and among patients of all ages, any delay in diagnosis potentially due to COVID-19 was not borne by patients of a particular gender or age. We recognize that this observation is limited to a 3-month period at one academic institution and may not be generalizable to all communities. We encourage other investigators to test this hypothesis because patients presenting

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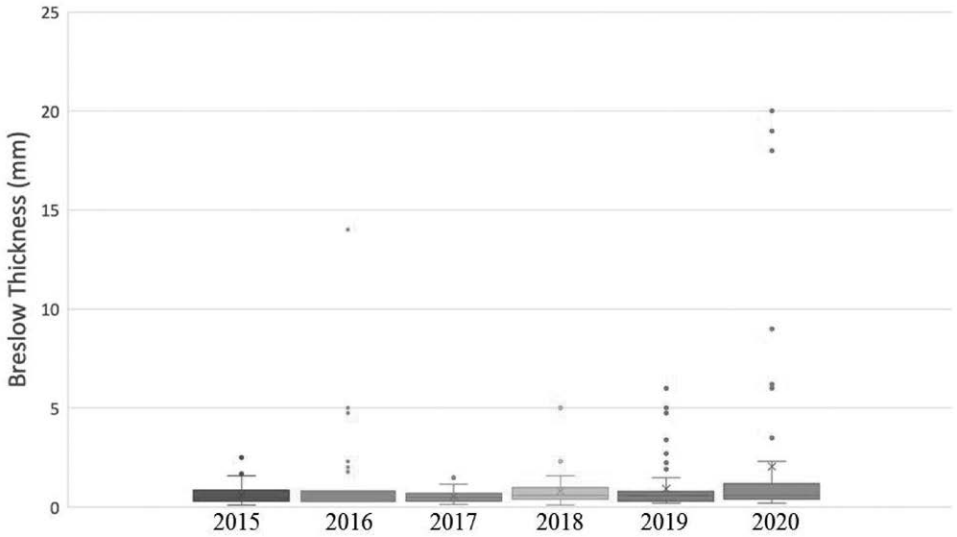
Fig. 1



Box and whisker plot–tumor thickness of invasive melanomas by year

Table 1 Tumor staging for invasive melanomas by year

	2015	2016	2017	2018	2019	2020
Stage	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
T1	64	45	35	32	50	41
T2	10	6	3	7	3	10
T3	1	1	0	1	3	3
T4	0	3	0	1	3	6

with more advanced stage disease at diagnosis have a worse prognosis, which typically requires more extensive diagnostic evaluations (e.g. sentinel node biopsy) and potentially aggressive treatments, resulting in greater healthcare costs and potentially increased morbidity and mortality [2,3]. Although not definitive, our results may serve to remind the community that efforts should be made to continue well-tolerated, in-person melanoma surveillance throughout the pandemic, as a delay in diagnosis by several months may have a significant impact on disease stage for some rapidly proliferating melanomas [1]. Further studies are needed to fully understand the impact of the COVID-19 pandemic on melanoma outcomes.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

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