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The significance of pressure injuries and purpura in COVID-19 patients hospitalized at a large urban academic medical center: A retrospective cohort study

To The Editor: Pressure injuries, a common skin finding that significantly impacts the quality of life in hospitalized patients, are associated with increased mortality and result in increased healthcare costs.[1] In COVID-19 infection, pressure injury sites are associated with purpuric lesions.[2] This study investigates the epidemiology and laboratory findings of these lesions to elucidate their etiology.

From March 12, 2020, to May 31, 2020, at a single institution, 1216 adults hospitalized with laboratory-confirmed SARS-CoV-2 infection were retrospectively reviewed. A centralized clinical data registry with search functionality combined with a manual chart review identified patients with skin lesions. At least 2 dermatologists, with a third dermatologist for adjudication, evaluated patient records for pressure injury and identified the presence or absence of purpuric features.

Altogether, 84 patients (6.9%) with 118 pressure injuries having onset concurrent with COVID-19 hospitalization were identified (Fig 1). The dermatologists were aided by photographs of 73.8% (n = 62/84) of the patients. The pressure injuries were associated with a prolonged length of stay (mean of 37.3 days) and high rates of endotracheal intubation (81.9%) (Table I). A portion of the patients (32.5%; n = 27/83) had pressure injuries with purpuric features. Laboratory values related to coagulopathy at lesion onset did not differ between patients with and without purpura, with the exception of D-dimer values, which were higher (P = .016) for patients with purpuric features (Supplemental Table I; available at https://doi.org/10.17632/vkzxr32ffr.1).

The incidence of pressure injury in this study (6.9%) is comparable to previous estimates of 5%-15% of hospitalized patients, depending on clinical context.[1] With respect to COVID-19 hospitalization specifically, the especially tenuous respiratory status in these critically ill patients frequently interfered with standard preventative measures to turn patients for inspection and pressure offloading.[1,3] Placing patients in a prone position has been demonstrated to reduce the development of pressure injuries and is associated with improved outcomes in the setting of a poor respiratory status.[4] However, this study discovered 36 pressure ulcers (30.5%) occurring on the face, likely resulting from proning, emphasizing specific challenges affecting patients with COVID-19 and the importance of prophylactic measures to prevent these injuries in proned patients.

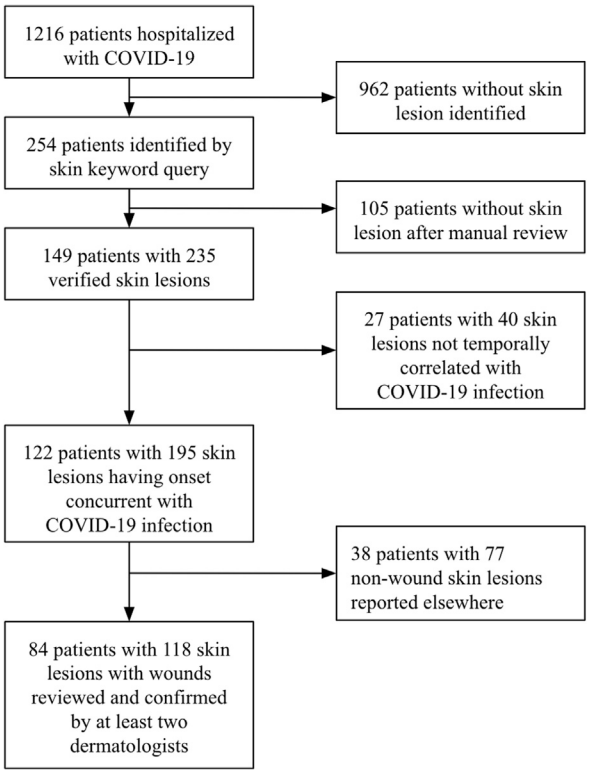

Fig 1. Flowchart of patient selection for constructing the study and control groups. Skin lesions were categorized as concurrent with COVID-19 hospitalization when onset occurred within 14 days prior to admission and up to discharge.

This study only found elevated D-dimer levels in patients with purpuric pressure injuries, corroborating previous reports of elevation of fibrin and fibrinogen degradation products in COVID-19.[5] Thromboembolic events and abnormalities in other markers of coagulation were not found to be more common in patients with purpuric pressure injuries within our cohort. Biopsies were obtained in 4 patients and previously reported as exhibiting epidermal and eccrine gland necrosis, supportive of pressure-induced injury, with fibrin thrombi in superficial dermal vessels only.[2] These findings suggest that purpuric features of pressure injuries are less likely indicative of occult pathology resulting from COVID-19 infection and emphasize the usual prevalence of pressure injuries in critically ill patients, highlighting the importance of identifying risk factors, encouraging preventative measures, and reinforcing the known standard of care. Taking steps

Table I. Comparison of patients with nonpurpuric and purpuric pressure injuries

Characteristic	Patients with nonpurpuric pressure injury* (n = 61)	Patients with purpuric pressure injury* (n = 27)	Total patients with pressure injury (n = 84)	*P* value†
Lesion evaluation				
Day of injury onset since admission (mean ± SD)	11.2 ± 8.0	14.3 ± 10.0	12.0 ± 9.0	.25
Dermatology consultation obtained	4 (6.6%)	7 (25.9%)	10 (11.9%)	.0070
Photographs obtained	40 (65.6%)	25 (92.6%)	62 (73.8%)	.0075
Demographics				
Age in years (mean ± SD)	60.9 ± 15.6	63.6 ± 14.8	61.9 ± 15.3	.49
Sex				
Male	45 (73.7%)	21 (77.8%)	61 (73.5%)	.54
Female	16 (26.2%)	6 (22.2%)	22 (26.5%)	
Patient past medical history				
BMI (mean ± SD)	31.8 ± 7.9	33.6 ± 9.6	32.1 ± 8.3	.25
Hypertension	25 (40.9%)	15 (55.6%)	38 (45.9%)	.21
Diabetes	25 (40.9%)	14 (51.9%)	36 (43.4%)	.28
Chronic heart disease	5 (8.2%)	1 (3.7%)	6 (7.2%)	.39
Chronic lung disease	7 (11.5%)	6 (22.2%)	12 (14.5%)	.16
Stroke/cerebrovascular accident	3 (4.9%)	2 (7.4%)	5 (6.0%)	.71
Smoking/cigarette use	24 (39.3%)	15 (55.6%)	36 (42.9%)	.16
Hospitalization				
Length of stay in days (mean ± SD)	36.5 ± 20.4	42.3 ± 25.1	37.3 ± 21.9	.15
Intensive care unit admission	52 (85.2%)	24 (88.9%)	71 (85.6%)	.55
Death	13 (21.0%)	4 (14.8%)	17 (20.5%)	.37
Treatment course				
Endotracheal intubation	50 (81.9%)	23 (85.2%)	68 (81.9%)	.59
Orogastric/nasogastric intubation	48 (78.6%)	21 (77.8%)	64 (77.1%)	.92
Urinary catheterization	52 (85.2%)	24 (88.9%)	71 (85.5%)	.55
Rectal intubation	49 (80.3%)	22 (81.5%)	66 (79.5%)	.76
Parenteral nutrition	11 (18.0%)	3 (11.1%)	12 (14.5%)	.55
Clinical course				
Cerebrovascular accident	-	1 (3.7%)	1 (1.2%)	-
Deep vein thrombosis	5 (8.2%)	1 (3.7%)	6 (7.2%)	.39
Pulmonary embolism	5 (8.2%)	3 (11.1%)	8 (9.6%)	.76
Intracranial hemorrhage	2 (3.3%)	-	2 (2.4%)	-
On therapeutic anticoagulation at onset of first injury	12 (19.7%)	8 (29.6%)	18 (21.4%)	.26

BMI, Body mass index; *SD*, standard deviation.
*4 patients had multiple pressure injuries of which some had purpuric features and others had only nonpurpuric features. Values for these patients are tabulated in both columns.
†Statistical testing is performed comparing patients having pressure injuries with purpuric features to patients having pressure injuries none of which had purpuric features.

to address predisposing factors in hospitalized COVID-19 patients is essential in preventing these lesions and improving outcomes.[1,3]

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Conflicts of interest

None disclosed.

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Diagnostic accuracy of teledermatology for nonmelanoma skin cancer: Can patients be referred directly for surgical management?

To the Editor: While many Veterans Affairs Medical Centers (VAMCs) use teledermatology, veterans still drive to VAMCs for biopsies of even classic-appearing skin cancers and again for treatment. Ideally, patients would only travel for treatment, saving the time and expense of an additional biopsy visit. Although studies have addressed the diagnostic accuracy of teledermatology for nonmelanoma skin cancers (NMSC),[1,2] we explored the possibility of teledermatology to efficiently triage patients to Mohs surgery.

In a cross-sectional study, all store-and-forward teledermatology consults placed to the Atlanta VAMC in 2013 were reviewed. Images were collected by standardized protocol of distant image for localization, close-up image with ruler, and dermoscopic image. Images were reviewed by resident physicians and 1 of 4 attending physicians. Of the 376 consults with NMSC as the primary or secondary differential diagnosis, 321 lesions were evaluated in-person and included for analysis.

All lesions with NMSC as the primary differential were considered high-suspicion. Those with a nonmalignant or premalignant primary differential and NMSC as the secondary differential were considered low-suspicion. High-suspicion lesions that were biopsy-confirmed malignancies were true-positives, and low-suspicion lesions that did not warrant biopsy upon in-person evaluation or were biopsy-confirmed benign were true-negatives. Low-suspicion lesions subsequently found to be malignant were false-negatives. High-suspicion lesions that did not warrant biopsy or were biopsy-confirmed benign were false-positives. Lesion location was stratified by Mohs Appropriate Use Criteria.[3] Diagnostic accuracy characteristics were calculated.

Table I summarizes lesion characteristics.[3] The sensitivity of a high-suspicion teledermatology diagnosis for NMSC was 92% (Table II), and the specificity was 49%, yielding a positive and negative predictive value of 61% and 88%, respectively. The high sensitivity of diagnosing NMSC supports teledermatology as a useful tool for triaging remote patients.[1,2,4]

Specificity and likelihood ratios improved within higher risk anatomic zones areas M (cheeks, forehead, scalp, neck, jawline, pretibial surface) and H (central face, eyelids, eyebrows, nose, lips, chin, ear and periauricular skin/sulci, temple, genitalia, areola and nipples, hands, feet, ankles, nail units). Subgroup analyses revealed the highest likelihood ratio of any NMSC in area M (3.56). For patients with a suspected basal cell carcinoma within area H, the high specificity (88%), relatively high sensitivity (70%), and high positive likelihood ratio (5.83) of a teledermatology diagnosis indicates that direct scheduling for definitive treatment without a separate biopsy visit could save costs. Of 39 lesions within area H with high suspicion for basal cell carcinoma, 28 separate initial biopsy visits could have been avoided by direct scheduling for Mohs during the 2013 calendar year.

Study limitations for this study included lack of confirmatory biopsy for all lesions and patients lost to follow-up. However, in the most recent 27 months, only 5.6% of patients with suspected NMSC were lost to follow-up. Interrater reliability is always a concern, but previous literature reported moderate—to—near-perfect interrater reliability for teledermatologic diagnosis of skin neoplasms.[5]

We conclude that although the specificity for detecting NMSC by teledermatology is low overall, resulting in some procedure referrals for benign lesions, the improved specificity in high-risk,