Correspondence

Acrofacial purpura and necrotic ulcerations in COVID-19: a case series from New York City

Dear Editor,

As COVID-19 continues to spread worldwide, the prognostic significance of its cutaneous manifestations has been increasingly scrutinized, including that of retiform purpura. Additionally, an increased incidence of thromboembolism has been seen in COVID-19,[1] and histopathologic evaluation of retiform purpura in COVID-19 patients demonstrated thrombotic vasculopathy suggestive of a hypercoagulable state.[2] To better characterize purpura and necrotic ulcerations in hospitalized COVID-19 patients and examine incidence of systemic coagulopathy in this population, we performed a retrospective review of patients seen within a tertiary care center during peak incidence of COVID-19 in New York City.

After IRB approval, we reviewed patient charts for whom dermatology and wound care were consulted at NYU Tisch and Bellevue Hospital from March 1 to May 1, 2020. Over 3,800 patients were hospitalized for COVID-19 during this time. Inclusion criteria consisted of positive SARS-CoV-2 PCR (severe acute respiratory syndrome coronavirus polymerase chain reaction) and presence of purpura and/or necrotic ulceration. Salient laboratory values and clinical outcomes were documented (Table 1). In an attempt to exclude typical hospital-acquired sacral pressure ulcers, patients solely with sacral purpura/necrosis were excluded.

We identified 21 PCR-positive COVID-19 patients with purpuric and/or necrotic ulcerations on the ears, face, distal extremities, and/or genitalia (Fig. 1). Fourteen of 21 patients had multiple sites of involvement including eight patients who also had sacral ulcers. In 17/21 patients, sites in direct contact with medical devices including nasal cannula, endotracheal tube, urinary catheter, or pulse oximeter were involved; devices were in place for a range of 2–30 days (median 11 days) at the time of dermatologic evaluation, and time between hospitalization and first identification of skin manifestations ranged from 2 to 33 days (median 19 days). Case age varied greatly and was younger overall (25–88 years, median age 56) than in prior reports of retiform purpura in COVID-19.[3] Only 3/21 patients were female. Most patients were critically ill; 19/21 required invasive mechanical ventilation and 18/21 required vasopressors within 2 weeks of lesion onset. All patients were intermittently proned.

In terms of systemic hypercoaguability, five patients developed deep vein thromboses and one experienced myocardial infarction. Sixteen developed acute kidney injury, possibly related to renal microthrombosis.[4] Therapeutic anticoagulation was initiated in 16/21 (76%) for a thrombotic event or elevated D-dimer: 13 prior to the recognition of cutaneous findings, while the remainder were transitioned from prophylactic to therapeutic doses of anticoagulation after cutaneous eruptions were noted.

Recent reports document a high incidence of coagulopathic events in COVID-19.[1] While the exact pathomechanism remains unclear, direct invasion of endothelial cells by SARS-CoV-2 virus and complement-mediated endothelial injury may promote[2] a microthrombotic syndrome with potential for cutaneous involvement. In our review of 21 patients, we demonstrate a propensity for acrofacial purpura and necrotic ulceration in COVID-19, often associated with minor pressure (including intermittent proning or contact with medical devices) and occurring on nonsacral sites. Moreover, we identify a 29% rate of detectable thromboembolic events, 76% incidence of acute renal injury possibly related to microthrombosis[4], and 90% incidence of severe COVID-19 pneumonia in this cohort, despite a younger median age than previously reported.[3] The majority of patients were men, likely reflective of increased COVID-19 disease severity as described in men compared with women.[5]

While sacral ulcerations are frequently seen in critically ill patients, acrofacial purpura and necrosis are less common. We posit that a microthrombotic syndrome associated with COVID-19 may result in acrofacial cutaneous purpura/necrosis and that pressure-associated tissue hypoxemia is an inciting factor in areas not typically prone to pressure-induced injury.

We highlight these cases to suggest increased vigilance for pressure-related cutaneous injury in severely ill COVID-19 patients. Further, observation of necrotic ulcerations may warrant heightened clinical suspicion for a procoagulant state and/or signs of other end-organ damage. These cutaneous findings may have implications regarding appropriate therapeutic anticoagulation targets, although additional prospective studies are needed.

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Table 1 Patient characteristics, relevant laboratory values, and clinical outcomes

Number	Sex/Age	Race	Location of lesions	Time of hospital admission to identification of lesions (days)	Time between possible inciting factor and onset of lesions, inciting factor	D-Dimer at time lesions noted (ng/ml, ref range <230)	Known history of coagulopathy	Deep vein thrombosis	Acute kidney injury	Arterial thrombus	Therapeutic anticoagulation	Invasive mechanical ventilation	Patient status at last encounter
1	F/88	White	Upper and lower vermillion and cutaneous lips, columella	7	7 days, hi-flow nasal cannula	5,369	None	No	No	No	Yes, for elevated D-dimer	No	Alive – not hospitalized
2	M/68	White	L ear and R cheek	14	10 days, intubation	3,730	None	No	Yes, requiring RRT	No	No	Yes	Alive – hospitalized
3	M/77	White	L upper arm, sacrum	26	No known inciting factor	6,022	None	Yes, identified 18 days prior to skin lesions	No	No	Yes, for elevated D-dimer	Yes	Dead
4	M/55	Asian	L cheek, sacrum	5	5 days, intubation	6,694	None	Yes, identified 2 months after skin lesions	Yes, not requiring RRT	No	Yes, for DVT	Yes	Alive – hospitalized
5	F/67	White	L buttock, R shin	23	No known inciting factor	1,918	Factor V Leiden	No	Yes, not requiring RRT	No	Yes, for elevated D-dimer	Yes	Dead
6	M/40	Hispanic or Latino	Glans penis	28	12 days, Foley catheter	2,746	None	Yes, identified 12 days after skin lesions	Yes, not requiring RRT	No	Yes, for DVT	Yes	Alive – not hospitalized
7	M/45	Hispanic or Latino	Posterior ear, trunk, extremities, periorbital	2	2 days, nasal cannula	2,977	None	No	No	No	Yes, for elevated D-dimer	No	Alive – not hospitalized
8	M/56	White	R index finger, forearm, sacrum	19	No known inciting factor	2,223	None	Yes, identified 4 days prior to skin lesions	Yes, not requiring RRT	No	Yes, for DVT	Yes	Alive – hospitalized
9	M/79	Hispanic or Latino	Upper cutaneous lip	14	12 days, intubation	-	Antiphospholipid syndrome	No	Prior end-stage renal disease on RRT	Yes – STEMI	Yes, for STEMI	Yes	Alive – not hospitalized
10	M/43	Hispanic or Latino	Upper and lower vermillion lips	29	24 days, intubation	1,071	Antiphospholipid syndrome	No	Yes, requiring RRT	No	No	Yes	Alive – not hospitalized
11	M/55	Hispanic or Latino	L ear, L cheek	33	30 days, intubation	2,686	None	No	Yes, requiring RRT	No	No	Yes	Dead
12	M/35	White	Soles of feet	30	No known inciting factor	410	None	No	No	No	Yes, for elevated D-dimer	Yes	Alive – not hospitalized
13	M/25	Hispanic or Latino	L ear	33	Unknown, ear pulse oximeter	1,158	None	No	Yes, requiring RRT	No	Yes, for elevated D-dimer	Yes	Alive – hospitalized

Table 1 Continued

Number	Sex/Age	Race	Location of lesions	Time of hospital admission to identification of lesions (days)	Time between possible inciting factor and onset of lesions, inciting factor	D-Dimer at time lesions noted (ng/ml, ref range <230)	Known history of coagulopathy	Deep vein thrombosis	Acute kidney injury	Arterial thrombus	Therapeutic anticoagulation	Invasive mechanical ventilation	Patient status at last encounter
14	M/65	White	Bilateral cheeks, buttocks, sacrum	12	5 days, intubation	533	None	No	Yes, not requiring RRT	No	No	Yes	Alive – hospitalized
15	M/49	White	R ear, sacrum	7	Unknown, ear pulse oximeter	744	None	No	Yes, not requiring RRT	No	Yes, for elevated D-dimer	Yes	Alive – not hospitalized
16	F/63	White	Upper and lower vermillion and cutaneous lip, columella, chin, nasal tip	4	3 days, intubation	349	None	No	Yes, not requiring RRT	No	Yes, for elevated D-dimer	Yes	Alive – not hospitalized
17	M/48	Black	R ear, inferior vermillion lip, glans penis, sacrum	30	Unknown, ear pulse oximeter	>10,000	None	No	Yes, requiring RRT	No	Yes, for atrial fibrillation	Yes	Alive – hospitalized
18	M/56	Black	Nose, chin, sacrum	23	22 days, intubation	2,813	None	No	Yes, not requiring RRT	No	Yes, for elevated D-dimer	Yes	Alive – not hospitalized
19	M/49	Hispanic or Latino	Columella, superior vermillion lip, L cheek	24	14 days, intubation	1,725	None	No	Yes, not requiring RRT	No	Yes, for elevated D-dimer	Yes	Dead
20	M/64	White	Chin, neck, bilateral arms, heels	6	6 days, intubation	2,537	None	Yes, identified 21 days after skin lesions	Yes, not requiring RRT	No	Yes, for atrial fibrillation/ DVT	Yes	Alive – not hospitalized
21	M/77	Hispanic or Latino	Bilateral cheeks, upper cutaneous lip, nares, sacrum	23	23 days, intubation	3,068	None	No	Yes, not requiring RRT	No	Yes, for elevated D-dimer	Yes	Alive – not hospitalized

F, female; M, male; L, left; R, right; RRT, renal replacement therapy; DVT, deep vein thrombosis; STEMI, ST-elevation myocardial infarction.

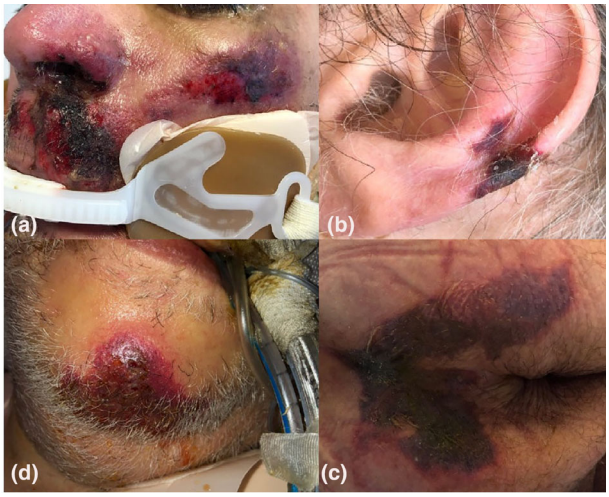

Figure 1 Examples of purpuric and necrotic lesions in severely ill patients with COVID-19 – (a) purpura, erosion, and eschar on cheeks and upper cutaneous lip in areas of skin contact with endotracheal tube holder, (b) retiform purpura on ear in area of skin in contact with pulse oximeter, (c) purpuric and necrotic lesion on the chin, (d) sacral purpura

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