DIFFERENTIATING COVID-19 CUTANEOUS LESIONS FROM DEEP TISSUE PRESSURE INJURY AND OTHER PURPLE LESIONS

Kathy Borchert, MS, APRN, CNS, CWOCN, CFCN
System WOC Program Manager, M Health Fairview Health System
Faculty, WEB WOC Continuing Education Program
OBJECTIVES

1. Differentiate cutaneous manifestations of COVID-19 from cutaneous manifestations of pressure injury.
2. Identify lab findings to suggestive of COVID-19 lesions vs. other “purple” lesions.
DIFFERENTIAL DIAGNOSIS: “PURPLE” LESIONS

Purpura = “Hemorrhage into the skin”

Differential is broad...

- Deep Tissue Pressure Injury
- Blunt Force Trauma
- Skin Failure
- Chronic Tissue Injury
- Infectious
- Inflammatory
- Coagulation dysfunction
- Thrombocytopenia
- Vessel deposition disorders
- Etc...etc...

Does NOT blanch with pressure
Cause can range from innocuous to life-threatening
DIFFERENTIATING OTHER “PURPLE” LESIONS

Deep Tissue Pressure Injury (DTPI)

Persistent non-blanchable deep red, maroon or purple discoloration

**Intact or non-intact** skin with localized area of persistent non-blanchable deep red, maroon, purple discoloration or epidermal separation revealing a dark wound bed or blood filled blister. **Pain and temperature change** often precede skin color changes. Discoloration may appear differently in darkly pigmented skin. This injury results from intense and/or prolonged pressure and shear forces at the bone-muscle interface. The wound **may evolve rapidly to reveal the actual extent of tissue injury, or may resolve without tissue loss.** If necrotic tissue, subcutaneous tissue, granulation tissue, fascia, muscle or other underlying structures are visible, this indicates a full thickness pressure injury (Unstageable, Stage 3 or Stage 4). **Do not use DTPI to describe vascular, traumatic, neuropathic, or dermatologic conditions.**

NPIAP Definition
DIFFERENTIATING OTHER “PURPLE” LESIONS

Blunt Force Trauma

Hx: Atrial Fibrillation
Medication list includes Coumadin
S/P Fall

Skin Failure
Death of the skin and underlying tissue due to poor blood circulation occurring in the context of multisystem organ failure.

Chronic Tissue Injury (CTI)

Purple-maroon discoloration with thinning of the epidermis, with or without open skin injury located on the fleshy portion of the buttocks and not necessarily over a bony prominence.

CTIs do not innately improve or deteriorate into partial or full-thickness injury.

Mahoney, M., Rozenboom, BJ. JWOCN 2019; 46(3):187-191
DIFFERENTIATING OTHER “PURPLE” LESIONS

Infectious

Ecthyma gangrenosum (*Pseudomonas*)
Angioinvasive fungal infections

Inflammatory

Vasculitis
Chilblains (pernio)
Differentiating other “Purple” lesions

Coagulation dysfunction
Medications (warfarin, heparin)
Platelet defects
Antiphospholipid antibody syndrome
  Disseminated intravascular coagulation (DIC)

Thrombocytopenia
Idiopathic thrombocytopenic purpura (ITP)
Thrombotic thrombocytopenic purpura (TTP)
DIFFERENTIATING OTHER “PURPLE” LESIONS

Embolization or deposition

Cholesterol emboli

Calciphylaxis
China: Health officials investigating potential SARS outbreak December 31

Health officials investigating potential SARS outbreak in Wuhan (Hubei province) December 31; 27 people infected with viral pneumonia

TIMEFRAME expected from 12/31/2019, 12:00 AM until 1/1/2020, 11:59 PM (Asia/Shanghai).
COUNTRY/REGION Wuhan (Hubei)

Coronavirus confirmed as pandemic by World Health Organization

Coronavirus in the U.S.: Latest Map and Case Count

FDA NEWS RELEASE
FDA Takes Key Action in Fight Against COVID-19
By Issuing Emergency Use Authorization for First COVID-19 Vaccine

Action Follows Thorough Evaluation of Available Safety, Effectiveness, and Manufacturing Quality Information by FDA Career Scientists, Input from Independent Experts

For Immediate Release: December 11, 2020
COVID-19 AND THE SKIN

Classification of the cutaneous manifestations of COVID-19: a rapid prospective nationwide consensus study in Spain with 375 cases

Nationwide case collection survey

Surveyed all Spanish dermatologists

Included all patients with:
- Eruption of recent onset and no clear explanation PLUS
- Suspected or confirmed COVID-19

Photographs reviewed by 4 independent dermatologists and consensus was reached on cutaneous patterns of disease

375 patients from April 3-16, 2019
COVID-19 AND THE SKIN

Acral erythema with vesicles or pustules (pseudo-chilblain) – 19%
Other vesicular eruptions – 9%
Urticarial lesions – 19%
Maculopapular eruptions – 47%
Livedo or necrosis – 6%

COVID-19 AND THE SKIN

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  · Urticaria = hives

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COVID-19 AND THE SKIN

Pernio (pseudo-chilblains)
- Feet/hands
- Hospitalized 16%

Vascular/urticarial/macular erythema/morbilliform
- Trunk/extremities
- Hospitalized 22-45%

Retiform purpura (livedoid/necrotic)
- Extremities/buttocks
- Hospitalized 100%

Severity of COVID-19*

NECROTIC COVID LESIONS VS PRESSURE INJURY
HISTOPATHOLOGICAL FINDINGS

COVID
- Non-inflammatory to pauci-inflammatory thrombi

Deep tissue pressure injury
- Blood vessel swelling, hemorrhage, cell death
- Usually NO thrombi

Magro and colleagues\textsuperscript{5} reported on 5 cases with an exceptionally high proportion of aberrant coagulation in severe cases of critically ill adult patients with COVID-19. Their COVID-19 patients exhibited a hypercoagulable state, featuring prolonged prothrombin time, elevated levels of D-dimer and fibrinogen, and near normal activated partial thromboplastin time. Two patients progressed to overt disseminated intravascular coagulation (DIC). DIC has been described before; Tang et al.\textsuperscript{9} reported that 71.4\% of non-survivors and 0.6\% of survivors of COVID-19 showed evidence of overt DIC.

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<tbody>
<tr>
<td>SARS-CoV-2</td>
<td>Negative</td>
<td>Positive</td>
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<tr>
<td>D-Dimer</td>
<td>0-0.5 ug/ml FEU</td>
<td>6.3</td>
<td>2.1</td>
<td>&gt;20.0</td>
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<td>Fibrinogen</td>
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<td>Prothrombin</td>
<td>22-37 secs</td>
<td>None</td>
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Purple areas on non-pressure loaded surfaces lack a pressure-shear etiology and should not be classified as pressure injuries. They may resemble purpura fulminans which is consistent with the histopathology noted above and has been reported in other systemic infections. They may also resemble other dermatological conditions associated with microvascular injury and thrombosis such as retiform purpura, livedo reticularis and cutaneous vasculitis.

Purple areas on pressure loaded surfaces (whether prone or supine) require further investigation. Deeper soft tissue may also be damaged because of pressure-shear, particularly in the buttocks, sacrum and coccyx when positioned supine or on the face, knees, and other high-risk body parts when positioned prone. We would recommend that discolored areas on any body surface subjected to pressure loading or shear be palpated to detect differences in tissue consistency and temperature to rule out concomitant deep tissue pressure injury. Theoretically, the same COVID-19 related vascular changes may be occurring in underlying soft tissue (e.g., muscle), rendering those tissues less tolerant of the damaging effects of pressure and shear. The histological specimens presented in the above case studies show clotting. Histological specimens of deep tissue pressure injuries showed frank necrosis of skin, fat, and muscle.11 The histological appearance of Deep Tissue Pressure Injury (DTPI) is not the same as the COVID-19 skin changes.
CASE #2

40 year old female

November, 2019- Heart Transplant

Readmissions: December, 2019 & February, 2020  Tricuspid valve vegetation

Admitted 3/2/2020, first COVID Test was 4/22/2020

No D-Dimer of PTT results during this time frame.

Patient developed unstageable sacral hospital acquired pressure injury in March and then this calf injury April 9th. DTPI evolved to unstageable 5/19/20.

WOC suspected this was a pressure injury from SCD tubing. Patient on low air loss mattress.

RN Interview: SCD tubing was never seen on this location.

RCA Results: No root cause.

Following review of NPIAP White Paper Skin Manifestations with COVID-19: The Purple Skin and Toes that you are seeing may not be Deep Tissue Pressure Injury it was speculated that this unexplained bruising that evolved to a full-thickness wound was most likely a COVID complication.
**CASE #3**

64 y.o male admitted 2/10/2021

COVID outbreak at work

Patient’s boss called him at home, no answer. He called the police when no answer at the door.

Patient found asleep on his couch, confused.

<table>
<thead>
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<th>Normal</th>
<th>2/10/21</th>
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Necrotic COVID lesions vs pressure injury clinical

Purple areas
Non-pressure loaded surfaces
No pressure-shear etiology

If purple areas are occurring on pressure loaded surfaces → investigate further

NECROTIC COVID LESIONS VS PRESSURE INJURY
LABORATORY FINDINGS

↑↑
- Fibrinogen
- Von Willebrand factor
- Fibrin degradation products (e.g. D-Dimer)

↔
- PT
- aPTT
- Antithrombin levels
- Activated protein C
- Platelets

“State of hypercoagulability coupled with severe inflammatory state rather than DIC”

Inflamm Res. 2020 Dec;69(12):1181-1189.
RETURNING TO...

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