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Pressure injury as insidious comorbidity in Ventilator-Dependent Respiratory Failure (VDRF) secondary to COVID-19: A Case Report

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Background

- According to the [National Pressure Ulcer Advisory Panel \(NPUAP\)](#): A pressure ulcer is a localized injury to skin and/or underlying tissue, usually over a *bony prominence and secondary to (long-term) pressure, shear, and/or friction*. Elevated pressure (without shifting) leads to capillary ischemia to that area of skin if *pressure >70mmHg*.
- Risk factors include (1) immobility, (2) AMS / poor sensation, (3) increased age, (4) incontinence, (5) elevated tissue temperature, (6) circulatory deficiencies, (7) anemia, and (8) nutrition deficits.
- Prevention strategies are (1) turning the patient Q2H when lying down, and (2) repositioning 15-20min (>30s) when seated.
- NPUAP Pressure Injury Staging: I - Non-blanchable erythema; II - Skin breakdown extends into dermis; III - Through dermis with subcutaneous fat exposed; IV - Muscle / tendon / bone exposed
- Deep tissue injury (DTI) is purple, intact skin; wound bed is not visualized.
- Unstageable wounds are Stage III or IV, but are unclear due to slough/debris.
- Treatment for pressure injuries: (1) Stage I & II – Relieve pressure (i.e. Prevention); (2) Stage III & IV – Debridement, Irrigation, Modalities (UV, laser, US, hyperbaric therapy, e-stim, skin flap); (3) Infections – topical/systemic antibiotics, wound culture; (4) Good nutrition (Vitamin C, Zn, Cu, protein).

Objective

To highlight opportunities to decrease adverse outcomes to the acute management of COVID-19 infection.

Methods

Design: Descriptive single-subject study

Setting: Inpatient/Acute rehabilitation

Participant: A 47-year-old female with Ventilator-Dependent Respiratory Failure (VDRF) secondary to COVID-19.

Interventions: In the ED, Patient was started on antibiotics (azithromycin, ceftriaxone), nebulizer treatments, intravenous fluids, and intramuscular corticosteroids (methylprednisolone).

On hospital admission, she was initiated on antiviral Remdesivir and received 1 unit of convalescent plasma. Self-proning was encouraged, yet Patient required progressive increase in oxygen (O₂) supplementation. She was intubated from Hospital Day (HD) 4 to 7. Wound care assessments began on HD10; wounds to low back and bilateral buttocks were noted. By HD15, O₂ requirements were further weaned, and Patient was transferred to Acute Inpatient Rehabilitation.

On Rehab admission, Patient had Leukocytosis and wounds noted as "Unstageable". Antibiotic coverage was increased (Cefepime). By HD28/Rehab Day (RD) 13, wound culture was positive, and antibiotic regimen was further supplemented (Metronidazole, Fluconazole, Daptomycin).

MRI thoracic spine and pelvis demonstrated "necrotizing soft-tissue infection" consistent with Necrotizing Fasciitis. Surgical debridement occurred HD31/RD16 with subsequent anemia, requiring transfusion. She underwent additional surgical debridement on HD38/RD23 and was returned to the Acute floors. She was discharged to home with outpatient wound care on HD53.

Results

Main Outcome Measures: Wound size (area).

Results:

Hospital Day (HD) 10: 284.39cm²; HD16/ Rehab Day (RD) 1: 698.6cm²; HD34/RD19: 265.66cm²; HD39: 747.72cm²; HD51: 992.80cm². ΔArea, Pre-Rehab (HD16/RD1 – HD10): (+) 414.2cm²; ΔArea, Rehab (HD34/RD19 – HD16/RD1): (-) 439.94; ΔArea, Post-Rehab (HD51 – HD34): (+) 727.14.

HD 10

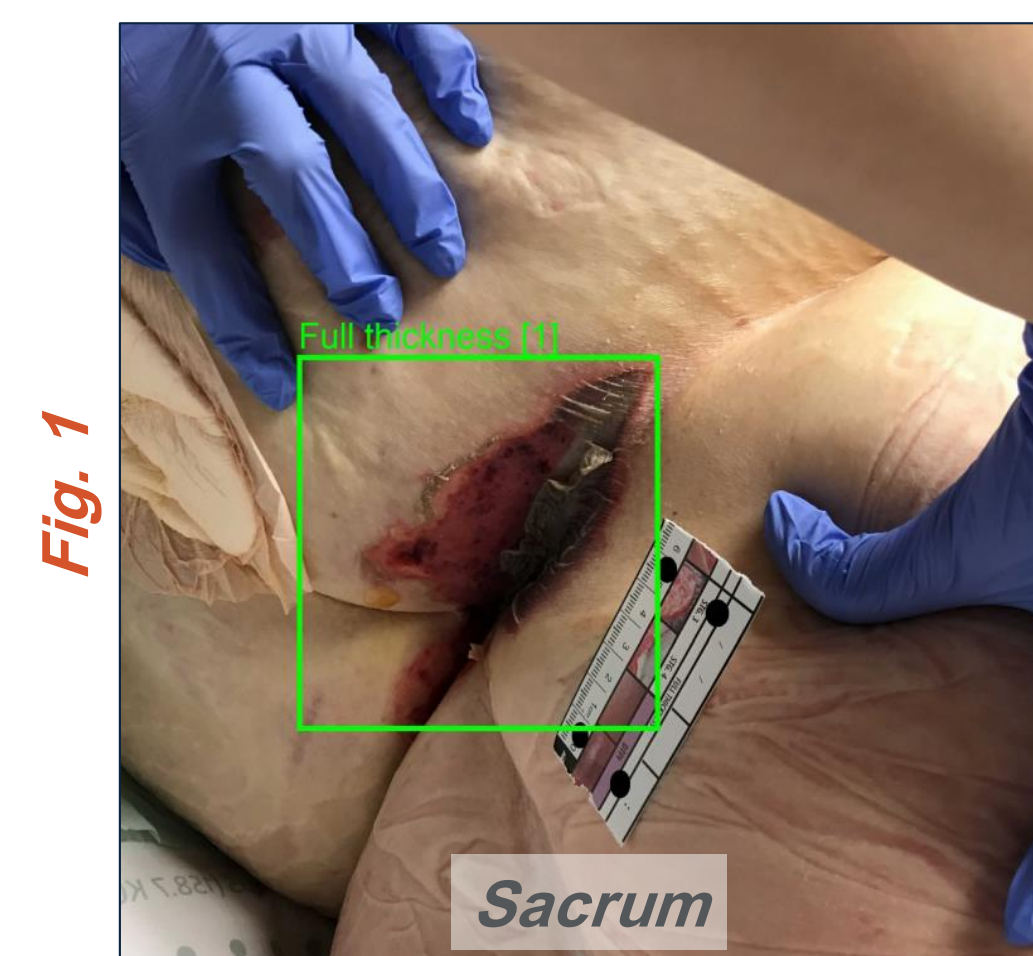


Fig. 1

HD 16 (RD 1)



Fig. 2

HD 28 (RD 13)

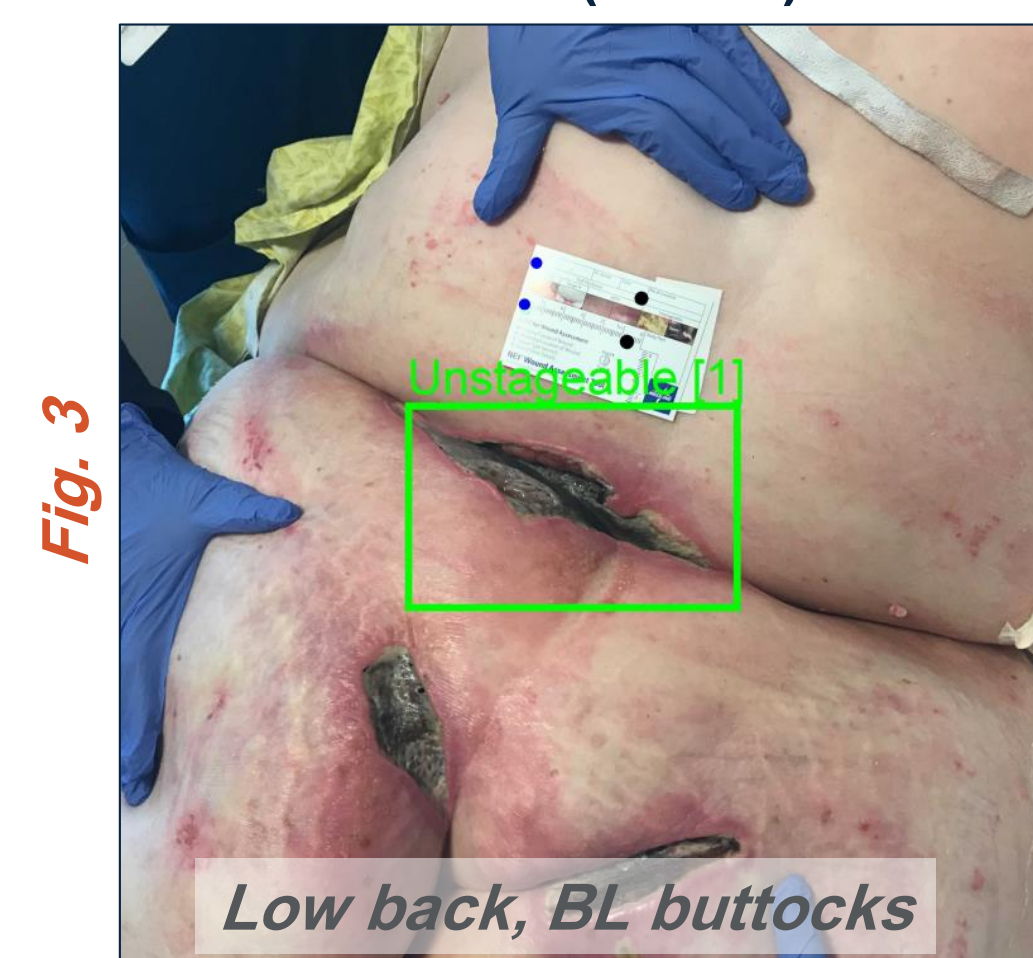


Fig. 3

HD 29 (RD 14)

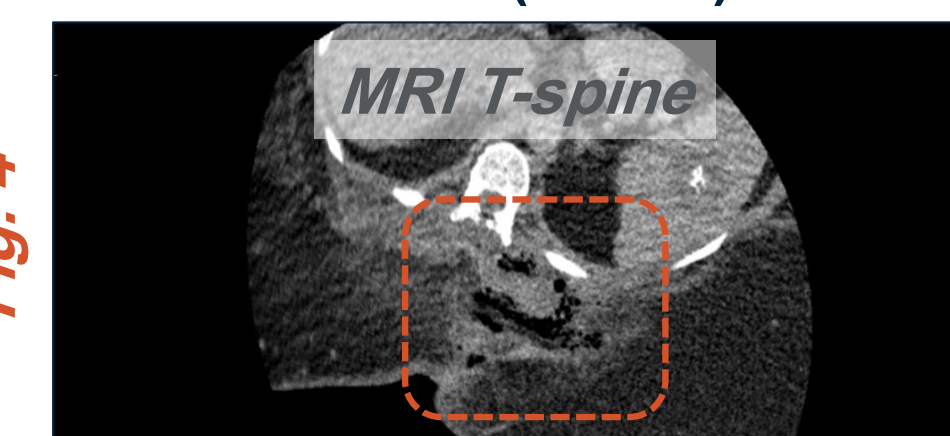


Fig. 4

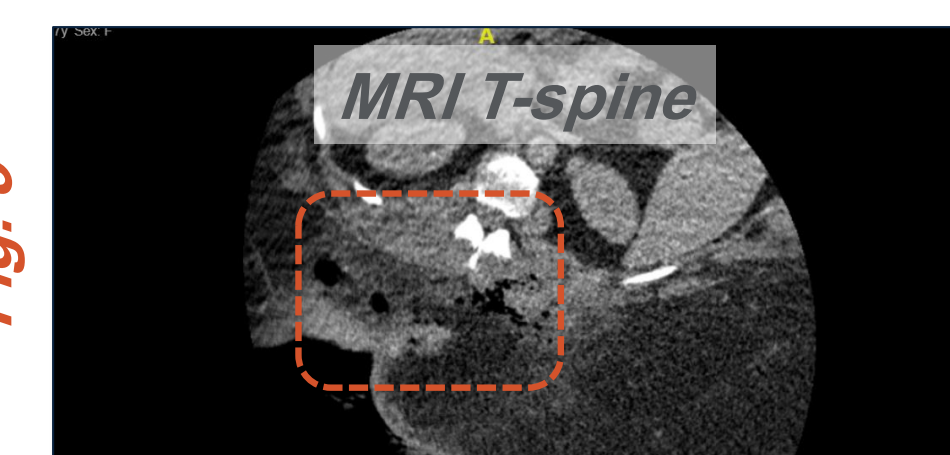


Fig. 5

HD 35 (RD 20)



Fig. 6

HD 47

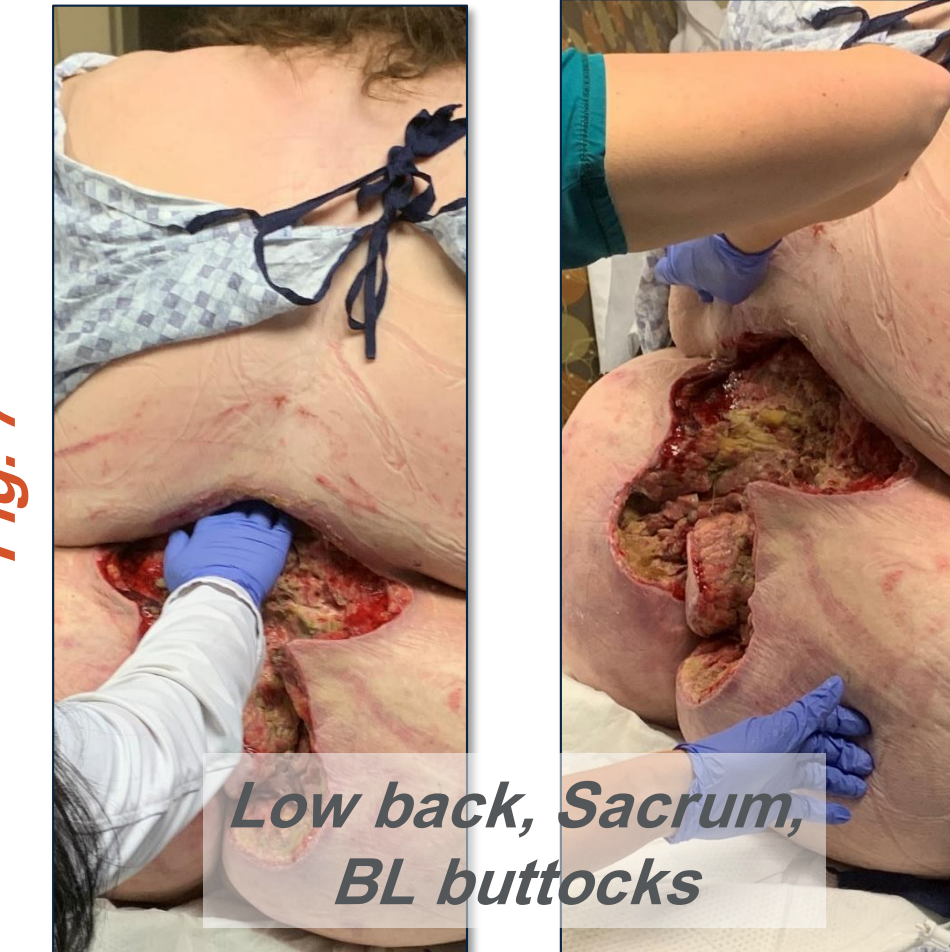


Fig. 7

Fig. 8

Discussion

- Pressure injury (PI), which may lead to bacteremia, sepsis, and death, is an insidious comorbidity frequently managed by Physical Medicine and Rehabilitation (PM&R) specialists - or physiatrists – in the rehabilitation setting. Notably, PI is also a known comorbidity in critically ill SARS-Cov2 patients.
- In early 2020, a multidisciplinary team from Peking Union Medical College Hospital (PUMCH) managed an ICU in *Wuhan*, Beijing, China. Of 109 patients, 46 (42.2%) developed pressure injury despite standard PI management. All 46 received invasive mechanical ventilation, initiated a median of 18 days from symptom onset, followed by PI a median of 8 days after intubation. The most common location to develop PI was the *sacrum* (89.1%), followed by the face (due to prone positioning).
- Team et al. has even provided best practice recommendations to prevent PI in the critically ill COVID-19 patient population. In addition to prone positioning and other ICU-appropriate protocols, the care team should provide skin assessments, frequent repositioning, hygiene management, and early *mobilization* – many of which are commonplace practices in the Inpatient Rehabilitation environment.
- This research coincides with the findings in this Case Report, which demonstrates wound decrease throughout Rehab stay (-)439.94cm², as compared to Pre-Rehab (+)414.2cm² and Post-Rehab (+) 727.14cm², which both demonstrated wound area increase, per Wound assessment documentation.

Conclusion

Standard Inpatient Rehabilitation practices may serve to ameliorate pressure injury management in cases of VDRF secondary to COVID-19. Further study is warranted on the potential integration of these standard practices as a preventative measure in the Acute and/or Critical care settings.

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