

COVID-19 skin damage challenges: a brief review

KEY WORDS

- ▶ Acro-ischæmia
- ▶ Deep tissue injury
- ▶ Personal protective equipment skin damage
- ▶ Vasopressor skin damage

The COVID-19 pandemic has highlighted areas of skin damage that have previously been written about in the tissue viability literature, but are not necessarily seen as mainstream topics. This article will discuss some of these topics, to include: personal protective equipment (PPE) skin damage to healthcare staff; vasopressor therapy skin damage; and acro-ischæmia or 'Covid toes'. Prevention strategies for PPE related skin damage will be briefly discussed. Plus look at how vasopressor skin damage can be mistaken for a deep tissue injury (DTI), and cover what to look for to differentiate between the two. Finishing with how acro-ischæmia may also be mistakenly categorised as a DTI.

The COVID-19 pandemic has highlighted areas of skin damage that have previously been written about in the tissue viability literature, but are not necessarily seen as mainstream topics. Suddenly, personal protective equipment (PPE) skin damage to health professionals was being discussed in the media. In addition, health professionals working in intensive care and high dependency units were seeing critically ill COVID-19 patients, many of whom were receiving high dose vasopressor therapy go on to develop darkened skin to their peripheral areas, which can be misreported as deep tissue injury (DTI) pressure ulcers (PU). This review article will discuss: PPE skin damage; vasopressor related skin damage; and the possibility that PU figures during the first surge of the COVID-19 pandemic may, as a result of many critically unwell patients receiving high dose vasopressor therapy and the disease itself, be potentially artificially inflated.

PPE skin damage

When the COVID-19 pandemic arrived in the UK in March 2020 the NHS had to embrace different ways of working at a significant speed of change. During the height of the pandemic there was a global increase of patients being admitted to and being cared for in the intensive care setting (Phua et al, 2020). As a result of this, there was quick

deployment of staff from other areas into both intensive care and high dependency units. Areas with COVID-19 positive patients require staff to wear a high level of PPE, including the wearing of filtering face piece masks abbreviated to FFP 2/3 masks (the number relates to the level of protection it offers). Many staff in intensive care and other departments/areas were wearing FFP 2/3 masks for long periods of time during their working day, which could be as much as 12 hours or more.

Skin damage from PPE is caused by pressure, shear and friction forces (Gefen et al, 2020; Gefen and Ousey, 2020); moisture from sweating and talking under the PPE adds to this damage (*Figure 1*). Therefore, the way to limit and prevent skin damage under PPE is to address these causes. How can pressure be off-loaded, shear and friction forces minimised and skin moisture balance achieved, particularly from the face and head of staff wearing FFP3 masks and visors? Things to consider for prevention of skin damage are:

- ▶ The careful application of masks/visors at the donning stage, ensuring the PPE fits well, but isn't too tight, or consider the use of a hood. Any change to the mask used must always be formally assessed to be correctly fitting and effective; local policy for fit testing must be adhered to at all times

- ▶▶ Rotating staff away from a PPE wearing area, where possible
- ▶▶ Looking at shift patterns to build in longer off-duty spells.
- ▶▶ Careful removal of PPE at the doffing stage to ensure skin that has been under the PPE is not damaged at this point. This includes taking care when cleansing the skin after wearing PPE.

In addition, it is essential that staff wearing PPE engage in a good skin care regimen and this should include the use of a moisturiser to ensure adequate skin hydration and health (Moncrieff, Van Onselen, Young, 2015). Where possible, staff should consider moisturising their skin during shift break times after the doffing of their PPE. Alongside this skin regimen there needs to be good intake of oral fluids to aid skin hydration, and this should help skin in its resilience against potential trauma caused by PPE. The use of a skin barrier cream under PPE can also be considered (Fisher and Tyrer, 2020). On the 9 April, 2020, during the height of the pandemic surge, NHS England and NHS Improvement released guidance 'Helping prevent facial skin damage beneath personal protective equipment'; this has subsequently been updated to version 2 in August 2020. The updated guidance now states that no dressing should be used in conjunction with FFP2/3 masks. Gefen and Ousey (2020) discuss the use of prophylactic dressings under FFP masks in their recent update to the Journal of Wound Care consensus document 'Device-related pressure ulcers: SECURE prevention', which was originally published in February 2020. In this update, Gefen and Ousey clearly state that the effects of prophylactic dressings under PPE may differ depending on the mask used by the member of staff. Additionally, whether the FFP mask is fulfilling its role efficiently as a protector against COVID-19 when used in conjunction with a prophylactic dressing is yet to be proven, and there is a requirement for further research in this area. In clinical practice it is essential that the above is taken into consideration, and local guidance is followed with regard to prophylactic dressing usage under FFP masks.

Many healthcare organisations have introduced staff clinics for PPE skin damage, which can be accessed both on-site and remotely. Ideally, any such clinic should involve both the tissue viability nurse/team, occupational health team and where possible involve dermatology. If the staff clinic does not have



Figure 1. ITU staff nurse displaying skin damage from facial PPE. Pictures are courtesy of Louise Benevento ITU staff nurse at Royal Papworth Hospital, Cambridge

access to a dermatologist or dermatology specialist nurse a clear referral pathway to dermatology, if required for complex lesions/damage, should be in

place. Finally, any form of skin damage from PPE to a staff member should have a completed incident form so that numbers and patterns of damage can be counted and analysed. This not only gives us the size of the problem, but potentially can identify patterns of damage alongside highlighting particular types of PPE that could be exacerbating skin damage.

Vasopressor therapy related skin damage

Vasopressor drugs are a powerful class of drugs that cause vasoconstriction, such as noradrenaline. As a result of this vasoconstriction within the vessels, the mean arterial pressure (MAP) improves through the movement of fluid from the lower limbs to the central area, i.e. blood supply from limb extremities to central organs. This can lead to reduced blood supply to the peripheries, which can then manifest as darkened areas to the feet, hands, sacral area, nose tip etc. (Daroca-Perez and Carrascosa, 2017).

It can be difficult to differentiate between DTI and vasopressor skin damage. However, there are some specific areas to look for when trying to do so.

DTI identification:

Firstly, we must always look at the patient history. Has the patient had a period of immobility, e.g. a previous fall that resulted in them lying on floor?

- ▶▶ Demarcated area of non-blanching purple or maroon skin, which may look like a bruise
- ▶▶ This area is often surrounded by an area of non-blanching erythema.
- ▶▶ Often intact skin, but may have a blood filled blister present (Wounds UK Consensus Document, 2017).
- ▶▶ Over a bony prominence, most commonly found at the heels, sacral area, ischium and in relation to medical devices (van Gilder et al, 2010).

Vasopressor skin damage identification:

- ▶▶ Patient is receiving, or has had, treatment with vasopressor drug therapy
- ▶▶ An area of non-blanching purple or black skin; this is often not demarcated.
- ▶▶ The skin damage is often bilateral and symmetrical, but can affect one side only particularly in the fingers (Simman, 2013; Daroca-Perez and Carrascosa, 2017)
- ▶▶ May not have a surrounding area of non-blanching erythema

Generally intact skin, but can go on to develop blisters that are generally serous fluid-filled, and can result in an open ulcerated area

Can be found in any peripheral area, e.g. toes, fingers, heels, sacral area, tip of nose etc.

What do we need to think about when managing suspected vasopressor skin damage?

As in DTI management, it is still important to off-load any pressure from bed clothes etc. In the situation where the skin damage involves the feet, heel troughs can be very useful. Nursing the patient on a high specification foam or alternating pressure mattress for pressure off-loading, with careful moving and handling, assuming the patient's condition allows repositioning. When blisters are present, use a non-adherent dressing for blister protection; if they were to rupture, consider a simple antimicrobial dressing to prevent infection, again ensuring any dressing applied is non-adherent. Aspiration of the blister/s can be considered if they are large or in a difficult position, which has the potential to affect mobility or functionality of the area. A good skin care regimen is essential, with the aim of ensuring the surrounding skin is hydrated. Alongside this, ask the question is the patient appropriately hydrated; engage in dialogue with the managing team, as many patients receiving vasopressor therapy may also be on a fluid restriction. As in any wound, vasopressor skin damage requires frequent inspection and assessment; ensure this is always clearly documented. Communication with both the patient and the family is crucial throughout.

Acro-ischæmia or 'Covid toes'

There have been publications during the COVID-19 pandemic that discuss a phenomenon seen in Covid patients, particularly the young, presenting with red/purple/mottled toes that are painful, named as an acro-ischæmia symptom, or so called 'Covid toes' (Campitelli and Kubiak, 2020). Acro simply means 'height', 'tip of something', 'of the extremities' (Oxford English Dictionary, 2020). Some early published papers looking at skin issues related to Covid are stating that Covid toes present like frostbite or Raynaud's disease, and may be related to vascular changes brought on by the COVID-19 virus which are not fully determined at the time of writing (Campitelli and Kubiak, 2020; Varga et al, 2020). It

appears the 'Covid toes' improvement after some weeks (Campitelli and Kubiak, 2020). It seems possible, in practice, that both vasopressor skin damage and 'Covid toes' could be mistaken as a pressure ulcers, namely a DTI. If this is the case, it is likely that during the COVID-19 pandemic we have the potential for recording artificially elevated pressure ulcer figures. This highlights that the patient's history is of paramount importance when making a diagnosis.

CONCLUSION

At the time of writing, we appear to be entering a second surge of the COVID-19 pandemic. It is therefore crucial that we continue to have clear guidelines in place for staff wearing PPE for long periods of time. These guidelines should be updated as further evidence to prevent skin damage presents itself. Staff should have access to clinics if they have skin damage or the signs of damage happening. We must record the size of the problem, and endeavor to identify pattern/themes of skin damage so that we can both continuously update our preventative strategies, and also identify where we need to put our research resources in the area. Vasopressor skin damage and 'Covid toes' are separate categories to PUs and we need to be able to effectively differentiate between these different types of skin damage in clinical practice. Actual numbers of these different types of skin damage need to be determined, so we understand the size of the problem, and gain some understanding of the trajectory of these types of skin damage.

This in turn will, again, help us to decide where to focus the research in the area. Finally, should we introduce new categories to run alongside existing PU categorisation charts to include, for example, vasopressor skin damage to assist staff in accurately defining each type of skin damage? **WUK**

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