Accurate assessment of different wound tissue types

To facilitate successful wound management is a key role of the tissue viability specialty. Accurate assessment of the type sof tissues involved in a given wound allows for correct diagnosis and the development of effective management strategies. Here, the author provides an overview of the tissue types commonly encountered during wound care.

Tissue viability is relevant to all medical and surgical specialities and all patient populations from neonates to the elderly (Patel and Tomic-Canic, 2014) and covers a wide range of wounds with the most common being surgical wounds, traumatic wounds, pressure ulcers, leg ulcers and skin tears.

Successful wound management is based on an accurate wound assessment. It is essential that a wound diagnosis is made: unless the cause of the wound is established then all that will follow is symptom management. Whereas, once the cause of the wound is determined, the underlying pathology can be treated and – in the majority of cases – healing is achievable.

The type of tissue seen in the wide range of wound types usually directs the topical wound management. There are certain tissue types that are common to the majority of wounds: necrosis, slough, granulation and epithelial tissue (*Table 1*). Often tissue types are identified based on the colour of the tissue, however, this is sometimes too simplistic and can result in misdiagnosis (e.g an exposed tendon can look similar to yellow slough). Therefore, the clinician needs to have an understanding of the local anatomy. The topical treatments may alter the colour of the tissue (e.g. silver- or iodine-based products can colour the tissues black or dark brown) and contribute to confusion if colour is used solely to assess tissue type. It is important to remember that a single wound may include a variety of different tissue types.

Rationale for assessment of tissue type

The assessment of tissue type assists with clinical decision making; it helps in planning appropriate wound care interventions and setting realistic goals.

The tissue in a wound bed may indicate the presence of wound infection. For example, an infected wound bed may present with a colour that is a result of the bacteria (e.g. the fluorescent green hue seen in cases of *Pseudomonas aeruginosa* [Metcalf et al, 2014]). A wound bed that bleeds easily and is friable may indicate infection (Butcher, 2013).

Debridement of the nonviable tissue can improve visualisation

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Table 1. Summary of tissue types, their presentation and management.

Tissue type	Clinical presentation	Management
Necrosis/eschar	Black/brown, wet or dry	Debridement; Exception being ischaemic and/or diabetic lower limbs and feet
Slough	Yellow/green/cream, wet or dry	Debridement
Granulation tissue	Red, uneven, strawberry jam like	Protection, moist wound environment
Epithelial tissue	Pale pink/white dots within the wound bed or at the wound edges	Protection, moist wound environment
Haematoma	Collection of blood clots sometimes covered with a thin layer of skin	Debridement using larval therapy (Rafter, 2012); monofilament fibre pad (Gray et al, 2011b) or hydrogels
Tendon/ligament	Yellow and shiny (unless dehydrated)	Protection and keep moist
Bone	White and hard (unless necrotic)	Promote granulation and prevent infection

of the wound and assessment of depth and extent (Swan and Orig, 2013). A suspected deep tissue injury is described as purple or maroon localised area of intact skin (National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel, 2014).

The identification of tissue type can indicate healing within a wound bed. The presence of an increasing amount of granulation tissue along with epithelial tissue signifies a healing wound. Reduction in necrosis and slough also denotes a positive step in the debridement of nonviable tissue in the wound bed (Gray et al, 2011a). The reduction in nonviable tissue and increase in granulation and epithelial tissue indicate the effectiveness – or not – of the current wound management plan.

Devitalised tissue (i.e. hyperkeratotic tissue, callus, slough and necrotic tissue) has no blood supply and will not become vital again with treatment and time. Within a wound bed, this nonviable tissue has a range of appearances: it may be yellow, grey, purple, black or brown and can have a soft or slimy consistency, or form hard, leatheryeschar (European Wound Management Association, 2004), depending largely on the hydration status of the tissue (Young, 2011; Wounds UK, 2013). The hydration of the tissue type will influence wound dressing selection and therapy (Kerr, 2014). Dry slough and necrosis require rehydration to facilitate debridement, whereas wet necrosis and slough will require an absorptive dressing. In addition, other therapies may be used to manage moisture in a wound bed (e.g. compression therapy or negative pressure wound therapy).

Differential diagnosis

The tissue type may be similar in different wound types however the underlying cause may be very different and require completely different wound management plans. An example of this is the confusion surrounding moisture lesions that are sometimes mistakenly categorised as category II pressure ulcers (All Wales Tissue Viability Nurses Forum, 2014). Both wound types are superficial in depth and can look similar. However, there are subtle differences between the two: pressure ulcers usually occur over bony prominences (unless they are device related; Tafti and Rafiei 2014) and moisture lesions are found at the perineum, buttocks, inner thigh, groin and in skin folds (e.g. under breasts). Moisture lesions have an irregular, diffuse edge while pressure ulcers have a definite, and usually traceable, edge.

When examining a wound bed the clinician may come across things that look unusual and if this is the case a second opinion should be sought. An example of this is the linear black thread that can be suture material present in a dehisced (broken down) surgical wound. Anecdotally it has been known for maggots to be present in wound beds due to accidental contamination. Calciphylaxis is a condition which can result in calcium deposits in leg ulcers, they are hard and white and will delay healing until removed (Milas et al, 2003).

The tissue type in a wound bed can follow a normal path towards healing whereby nonviable tissue is debrided and replaced with granulation and then subsequently closed with layers of epithelial tissue. However, in some wounds the tissue type may change and regress. An example is pressure ulcers that become infected and develop necrotising soft tissue infections (Mizokami et al, 2013).

Another sinister development is when a Squamous cell carcinoma develops in a chronic leg ulcer. Frequently the tissue in the ulcer bed is static and non-healing and suddenly starts to grow an abundance of new tissue without any change in the treatment regimen. A biopsy of the tissue will identify the malignant transformation in the wound bed (Chase-Tobin and Sanger, 2014).

Assessment tools

In most clinical areas, a wound assessment tool is used to guide a systematic assessment of the wound and the presenting symptoms. Greatrex-White and Moxey (2015) reviewed published wound assessment tools to identify the criteria for optimal wound assessment. They suggest that it is important for nurses to be able to accurately establish the condition of the wound, decide on a suitable treatment and determine if it is improving, static or deteriorating. A wound assessment tool provides both a framework for inexperienced nurses and a systematic and thorough source of documentation for others.

Developing an optimal wound assessment tool is not easy: too much detail can lead to documentation overload, too little and there would be insufficient detail from which to plan care. Some aspects of assessment – for example the ankle:brachial pressure index – are not relevant to all wound types, so may not be included within a generic wound assessment chart.

In specific wound types individual tools have been developed to identify and record the tissue type:

- The Society of Radiographers use a tool to assess and document the tissue type in radiotherapy reactions (see http://bit.ly/1C7Sbcx)
- Healthcare Improvement Scotland have developed a skin excoriation assessment (see http://bit.ly/1jFeDEz)
- A third tool relating to skin tears has been developed to simplify the way these acute wounds are assessed and recorded (Le Blanc et al, 2014). The assessment tool is part of a larger skin tear resource kit that provides

information on how to prevent and treat these wounds (see http://bit.ly/1BcHMkM)

Conclusion

Wound assessment is part of the systematic and holistic assessment of individuals with wounds. A detailed inspection of the tissue type is necessary to help determine the status of the wound and inform wound care management plans.

The examination of the tissue type commonly involves the colour and hydration of the tissue. It can help to detect wound infection, correctly categorise pressure ulcers and identify wound healing and deterioration. There are several tissue types commonly seen in wounds ranging from necrosis and slough to granulation and epithelial tissue. The tissue type within a wound bed can change and unusual presentations may herald malignancy in a wound bed.

Wounds of different aetiologies may have a similar appearance but a different cause (e.g. moisture lesions and category II pressure ulcers) and the clinician will have to be able to differentiate between the clinical presentations using history taking and holistic assessment skills to establish the cause. Tools exist to help clinicians assess and document specific wound tissue types. It is important that the tissue type within the wound bed is accurately assessed to ensure it is managed correctly leading to a positive outcome for the patient.

Though this article has focussed on the wound bed and tissue type, it must be acknowledged that this is only one aspect of the assessment process for an individual with a wound. WE

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