Defining, assessing and managing cavity wounds

KEY WORDS
- Cavity wound
- Assessment
- Debridement
- Documentation
- Treatment selection
- Negative pressure wound therapy

This paper provides an overview of cavity wounds, focusing on the definition, assessment and management of a common clinical problem in wound care. The term cavity wound is applied widely to a diverse range of acute and chronic wound types and, although each type requires a specific wound management approach reflecting the causation, the overall principles of cavity wound assessment and management remain the same. The extent of a cavity wounds can be difficult to visualise and such wounds require precise documentation and wound measurement if progress is to be accurately monitored and patient safety maintained.

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A cavity wound has been defined as any wound that extends beneath the layers of the dermis (Timmons and Cooper, 2008). As such this may expose underlying structures such as fascia, tendons, muscle and bone (Williams, 1997).

Using this definition, all open acute and chronic wounds extending into the dermal layer are cavity wounds, only superficial pressure ulceration (Category I and II), superficial burns and lacerations, blistering and closed surgical wounds being excluded from this definition. Many practitioners would, however, not regard 'shallow' superficial wounds such as majority of venous leg ulcers as cavity wounds. Williams (1997) definition of a cavity wound suggests that it is any wound requiring more than a simple flat dressing. As such cavity wounds require contact 'filler' dressings and potentially additional nursing assessment, skills and time to treat.

Chaloner and Poole (1995) defined a cavity wound as wounds deeper than 2 cm. In a study of patients managed by four community clinics in one community trust locality, these authors found 54 patients with cavity wounds, out of a caseload of 1957 patients using their definition.

Dealey (1997) in a questionnaire survey of 100 randomly selected district nurses identified 430 cavity wounds of which 27.4% were pressure ulcers, 27% surgical wounds, 22.1% pilonidal sinus, 17% abscess and 6.5% other wound types.

Major wound care prevalence studies undertaken in the UK (Srinivasaiah, et al, 2007; Vowden and Vowden, 2009a; Hopkins and Worboys, 2014) make no direct reference to cavity wounds, however, these studies did measure the prevalence of specific wound types and it is possible to infer from this the likely proportion of cavity wounds encountered. Srinivasaiah et al (2007) identified 147 Category III or IV pressure ulcers and 210 open or dehisced surgical wounds out of 1644 wounds. This equates to a minimum of 21.7% wounds being cavity wounds. Vowden and Vowden (2009b; 2009c) identified 120 Category III or IV pressure ulcers and 233 complicated surgical wounds out of 2620 wounds (a minimum of 13.5% wounds fitting the definition of a cavity wound). Hopkins and Worboys (2014) found 16 Category III or IV pressure ulcers and 33 complicated surgical wounds in 325 wounds (15% cavity wounds). In addition, Hopkins and Worboys (2014) note 22 abscess wounds that also may reflect cavity wounds. These estimated figures would underestimate the true prevalence of cavity wounds, as they do not include diabetic foot ulcer, traumatic wounds or leg ulcers some of which could be classified as cavities.

Cavity wounds may present with a number of additional features (Williams, 1997; Timmons and Cooper, 2008) that may complicate treatment:

- Sinus formation in which a blind-ending tract extends from the skin surface to an underlying

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cavity (Butcher, 1999), this may originate from an abscess cavity, from liquefaction of haematoma or tissue under intact but non-viable skin (deep tissue injury such as that caused by pressure) or following fat necrosis or infection.

- A fistula which is an abnormal passage between two epithelial surfaces that connect one viscera to another or to the body surface and may complicate abdominal wound dehiscence
- Undermining in which the dimensions of the cavity exceed those of the epidermal opening
- Bridging when partial healing occurs over a cavity wound or when partial wound breakdown occurs leaving a bridge of tissue over an otherwise dehisced wound.

These variations can make cavity wounds difficult to assess, complicated to treat and problematic to include in randomised controlled trials, as they do not form a homogenous group. For these reasons there is a lack of good level 1 evidence on which to base practice.

ASSESSING CAVITY WOUNDS

The same basic holistic strategy for assessment applies to all wounds and combines data on patient needs, systemic disease, anatomical location, wound descriptors and status and periwound skin condition to formulate a patient and wound specific treatment plan.

Defining wound descriptors for cavity wounds can be difficult. Physical measurement of cavity wounds can be challenging, undermining and the distortion of the wound caused by gaining access can make surface measurements inaccurate and depth and volume estimates problematic. For this reason, most practitioners rely on simple ruler-based linear measurements of width, breath and depth. Alternatives techniques, including photographic imaging, have been reviewed by Little et al (2009) and Vowden (1995), and commercial systems (e.g. Eykona: Fuel 3D Technologies; Silhouette®: Aranz Medical Limited) (Miller et al, 2012; Hallam et al, 2013) are now available that give both area and volume measurements and do also allow colour analysis. The accuracy of these systems is, however, still limited by the surface anatomy and curvature and the position of the wound, the position of the patient and the degree of undermining or tracking. Given the limitations of current measurement systems, it is therefore important that the wound is accurately described and that a written description is accompanied by an orientated wound diagram that includes documentation and measurement of undermining, tracking, bridging, sinuses and, if present, possible fistulae. This may be a simple clock face or a more complex detailed map. The description should also record the wound bed and exposed tissue type (e.g. muscle, bone, fascia), noting the presence of granulation tissue (healthy and friable), necrotic tissue and slough. It can be useful to note the relative percentages of each tissue type (Stremitzer et al, 2007).

The shape of the cavity wound may prevent adequate wound inspection and may prevent effective wound assessment as will the presence of slough, necrotic tissue or pooled exudate, and this may prevent accurate assessment of the true wound depth or the tissue types involved. If a full assessment cannot be achieved, this should be documented and recorded in the notes. In such situations, consideration should be given to wound debridement and, in some situations such as abscess or sinus formation, surgical intervention to lay open the wound to allow full inspection and adequate drainage and access for wound dressing (Butcher, 1999).

Reassessment, including wound measurement, should follow debridement as the wound size will increase and only when all necrotic tissue is removed will the full extent of the wound be recognised. This is particularly important when assessing pressure ulceration as ulcer category may change, particularly if the initial category was unstageable or possible deep tissue injury (National Pressure Ulcer Advisory Panel European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance, 2014), for example a pressure ulcer may move from unstageable to Category III or IV.

In addition to the standard description of exudate (colour, volume, consistency) (World Union of Wound Healing Societies, 2007; Romanelli et al, 2010; Vowden et al, 2015) consideration should be given to possible pooling sites within the cavity wound and whether there is a specific drainage route resulting in focal periwound skin maceration. This may be influenced by the situation and position in which the patient is cared for and the patient's level of activity. Whenever possible, patients should be nursed in a way that avoids or minimises exudate pooling within the wound or encouraged to mobilise to allow and encourage drainage of exudate from the deeper recesses of the wound. A drain positioned into a cavity wound, particularly one with a small entry sinus may be useful to assist drainage, care should be taken to maintain a drainage route and avoid plugging of the sinus tract (Butcher, 1999). To prevent leakage and soiling dressings with appropriate absorbency and, if appropriate, antimicrobial characteristics should be chosen and dressing frequency adjusted to match exudate levels (Romanelli et al, 2010), a skin barrier product may be used to protect the periwound skin and reduce the risk of skin maceration (Guest et al, 2011).

As with any wound odour, increasing exudate levels, the wound bed status, increasing wound pain or the presence of local or system signs of sepsis such as cellulitis may indicate the presence of infection and should inform the treatment plan. Recognising the signs of infection can be challenging and there may only be subtle changes in the wound such as delayed healing, discolouration of the wound bed or friable, bleeding granulation tissue (European Wound Management Association [EWMA], 2005).

The aim of assessment is to inform a structured treatment plan that includes a rationale for action and an outcome goal for therapy, and addresses issues relating to wound causation. With the wound cause identified, measures can be taken to address this such as appropriate pressure relief and offloading, infection management such as abscess drainage. These measures should be combined with optimising management of conditions such as diabetes and addressing nutritional deficiencies and anaemia. The principles of wound management defined by the TIME (Tissue management, Infection, Moisture, Edges) framework (Dowsett, 2008; Leaper et al, 2012) are equally applicable to cavity wounds as to other wound types and should inform the sequence of treatments, actions and dressing choice.

CLEANSING AND DEBRIDEMENT

Removing slough, debris and necrotic tissue from a cavity wound can be challenging and may require a modified approach to care. Necrotic tissue may be removed by sharp or surgical debridement but this needs specialist skills and frequently needs to be combined with alternative debridement techniques (Chadwick et al, 2013). Larval debridement with bagged maggots offers an effective treatment if the wound anatomy and position is suitable for larval survival, however, for the majority of wounds dressing combinations favouring autolytic debridement will be the main method used for primary and maintenance debridement therapy (Gray et al, 2011).

If larval debridement therapy is used, it should be noted that it can cause discomfort (Mumcuoglu et al, 2012) and is contraindicated in patients with a bleeding disorder and should be used with caution when applied in areas communicating with a body cavity (Vowden and Vowden, 2014; Tweedle et al, 2014).

Irrespective of the debridement technique cavity wounds will require careful cleansing and the method chosen will largely be controlled by access to the wound cavity. Cleansing is necessary not only to remove accumulated pus, slough and exudate but also to assist in the removal of any dressing material residue. Options include mechanical cleansing and debridement using, if wound dimensions allow, an agent such as a monofilament debridement pad, wound irrigation with sodium chloride 0.9% or an antimicrobial solution such as polyhexanide or octenidine (Horrocks, 2006; Kaehn and Eberlein, 2009). Alternatives include pressurised irrigation or pulsed lavage (Shetty et al, 2014). The use of antimicrobials especially in combination with or after mechanical debriding using agents such as monofilament debridement pads may have additional advantages by disrupting biofilms, and reducing bacterial load (Horrocks, 2006; Bahr et al, 2011; Westgate, 2012; Reddersen et al, 2014; Wiegand et al, 2014). The National Institute for Health and Care Excellence (NICE) has developed guidance on the use of Debrisoft® monofilament debridement pads in both acute and chronic wounds (National Institute for Health and Care Excellence [NICE], 2014) that include reference to bacterial management.

Recent developments of negative pressure wound therapy (NPWT) have allowed the combination of instillation therapy with negative pressure wound management and this has the potential to enhance cavity wound management, reducing bacterial load and assist healing (Raad et al, 2010; Rycerz et al, 2013). As with all dressings adequate access to the cavity must be available to ensure effective use of NPWT.

DRESSINGS FOR CAVITY WOUNDS

The principles of wound dressing selection has been reviewed by Vowden and Vowden (2014) and apply as much to cavity wounds as to any other wound type.

A number of specific dressing properties are

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important when selecting dressings or combinations of dressings for cavity wound, management:

- The dressing must maintain a suitable moist wound environment whilst being able to control and absorb exudate
- The dressing should assist or maintain autolytic debridement
- The dressing must facilitate free drainage of exudate
- Application and subsequent removal should, when ever possible, be pain-free
- The dressing should not shed fibres or easily fragment on removal as this may leave dressing residue as a foreign body within the cavity wound
- The dressing should not compromise the surrounding skin.

The use of gauze in chronic cavity wound management has been widely condemned while the role of gauze, as a primary dressing for open surgical wounds, remains controversial. Dinah and Adhikari (2006) highlights the paucity of robust evidence supporting dressing choice for managing open surgical wounds and cavities but suggests that surgeons should move away from the use of traditional soaked gauze dressings, in addition NICE guidance (NICE, 2008; NICE, 2014) does not support the use of gauze in surgical wound or pressure ulcer management. A suggested alternative is that surgical cavity wounds are managed with a hydrofiber or alginate (Alimov et al, 2013; Meaume et al, 2013), with or without an antimicrobial component depending on predicted bioburden, covered with a secondary dressing such as a hydrocolloid or foam dressing (Vowden and Vowden, 2014). In wounds with high exudate capillary dressings or superabsorbent dressings may be necessary (Hindhede and Meuleneire, 2012; Faucher, et al, 2012).

The role of packing, particularly in acute wound management remains controversial and there is little clear evidence supporting the widespread use of this technique other than as a method of haemostasis. O'Malley et al (2009) reported that not packing simple cutaneous abscesses did not result in any increased morbidity, and patients reported less pain and used fewer pain medications than those patients with packed wounds.

In cavity wounds, particularly those with undermining or sinus tracts dressing use should facilitate drainage and should not cause sinus tract plugging (Butcher, 1999). Bell et al (2009) emphasize the danger of over-packing wounds, indicating that to do so can result in a reversal of the wound healing process. In some situation a drain or tube may be useful to allow free drainage and prevent premature closure of the sinus opening in the skin (Butcher, 1999).

The advent of negative pressure wound therapy (NPWT) in the 1990s has progressively changed both acute and chronic cavity wound management (Rycerz et al, 2012). Although recognised as an effective method of care, traditional NPWT requires careful wound bed preparation, with adequate debridement and infection control, prior to the instigation of therapy and should be seen as a phase in wound management designed to prepare a wound for surgical closure or conventional dressing management.

Irrespective of the dressing material chosen the management of cavity wounds requires careful documentation if complications and their potential medico-legal consequences are to be avoided. Inadequate initial or subsequent assessments may fail to recognise deep infection, such as osteomyelitis, and failure to adequately document dressing usage may result in retained dressing material, which may act as a foreign body and cause delayed or non-healing, persistent infection, worsening wound pain, increasing exudate production, sinus formation or late recurrent wound breakdown. The presence of implanted foreign material such as a joint prosthesis, mesh or arterial bypass graft in proximity to a cavity wound requires urgent surgical review as does suspicion of deep infection or retained dressing material. Leijnen and Steenvoorde (2008) and Mazoch and Montgomery (2015) describe cases where NPWT foam dressing was retained leading to wound complications and the need for further surgical intervention.

To avoid potential problems when dressing a cavity wound record the product(s) used, noting if it is an absorbable or non-absorbable dressing, and the location and number of pieces of each dressing product used both in words and on a supporting orientated wound diagram. When tailoring a dressing ensure that the product is suitable for cutting and do not cut the product over the wound to avoid potentially contaminating the wound with loose fibres or foam. Record if a non-adherent wound interface layer has been used in combination with an absorptive dressing or with a NPWT wound filler. With cavity wounds documentation should always assist the next person to dress and evaluate progress of the wound.

CONCLUSION

There is no clear agreement as to what constitutes a cavity wound and what, if anything makes a cavity wound different from other wounds. Few, if any, studies have looked specifically at the subject of cavity wound management and as such there is a paucity of evidence on which to base treatment recommendations. It is, however, possible to give broad advice on cavity wound management based on the generic principles of wound management described in TIME. NPWT is increasingly used for cavity wound management but its use must be integrated into a plan of care that starts with adequate debridement and wound bed preparation and includes defined endpoint such as progression to standard dressings or surgery. The paucity of good quality clinical research directed specifically at cavity wound management needs to be addressed and clear guidance established defining best practice. WUK

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