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Background

The presence of necrotic or infected tissue in a wound (including diabetic wound) creates a significant barrier to healing. According to National Diabetes Registry Report 2013-2019, the proportion of patients with diabetic foot ulcers remained static at 1.2% to 1.3% over the six years. If an unintended consequence of surgical debridement was performed, this might have a significant impact on clinical outcomes because the greater the excision of healthy tissue, the worse the resulting scar or tissue function might be. Removal of healthy tissue more than necessary may also lead to greater blood loss compared with precise removal of necrotic tissue alone.

There are several types of conventional techniques of debridement that can achieve removal of devitalised tissue. The autolytic debridement is a natural process by which endogenous phagocytic cells and proteolytic enzymes break down necrotic tissue. However, this technique is a slow process, similarly as the enzymatic debridement. The enzymatic debridement is a selective technique using an exogenous proteolytic enzyme, collagenase, to debride Clostridium bacteria. Nevertheless, this technique is not recommended for an advanced process. In contrast, the mechanical debridement is a nonselective technique but has possibility to cause infection where water baths are used. As for the biological debridement, this technique uses sterile larvae on the necrotic tissue. The sterile medical grade maggots however are hard to be found. Lastly, the use of sharp instruments in surgical debridement has high potential to cause bleeding and complications due to anesthesia.

Hydrosurgery technique for debridement

In the last decades, hydrosurgery has become available as an alternative technique for tangential excision alongside the golden standard of conventional tangential excision by guarded knives. The hydrosurgery debridement is a technique that removes tissue tangentially from the wound surface. Intrinsically, it may be capable of preserving more viable tissue than conventional surgical debridement and perhaps lead to less operative bleeding.

In term of local practice in Malaysia, the hydrosurgery technique for wound debridement is being practised in public and private health facilities. For instance, the Orthopedics and Traumatology department, Plastic and Reconstructive Surgery department, and Wound Care Unit in Hospital Kuala Lumpur utilise this system as one of the debridement techniques.

VersaJet™ hydrosurgery system

The VersaJet™ hydrosurgery was developed in 1997 for the purpose of debriding many types of wounds, including burns prior to skin grafting. The original system was superseded by the VersaJet II™ (Smith and Nephew) hydrosurgery system in 2011. This system uses a high-pressure jet of sterile normal saline to debride wounds, drawing tissue debris and fluid into a chamber via the Venturi effect created by the normal saline jet. However, the actual benefit of VersaJet™ is uncertain. Thus, this technology review was requested by the Orthopaedic Department, Hospital Kajang, to provide an update on the best available evidence related to the VersaJet™ hydrosurgery system for debridement.

Objective

To evaluate the efficacy, safety, cost-effectiveness and organisational issue related to VersaJet™ hydrosurgery system for debridement.

Methods

Electronic databases were searched through the Ovid interface; Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to 13 August 2021, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily 1946 to August 13, 2021, Ovid MEDLINE(R) and In-Process, In-Data-Review & Other Non-Indexed Citations 1946 to August 13, 2021, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process, In-Data-Review & Other Non-Indexed Citations and Daily 2017 to August 13, 2021, Ovid MEDLINE(R) 1946 to August Week 1 2021, Ovid MEDLINE(R) 1996 to August Week 1 2021, Ovid MEDLINE(R) Epub Ahead of Print August 13, 2021, Ovid MEDLINE(R) Daily Update August 13, 2021 and Ovid MEDLINE(R) 2017 to August Week 1 2021. Searches were also run in PubMed, INAHTA, Cochrane Library and US Food and Drug Administration. Google was used to search for additional web-based materials and information. Additional articles were identified from reviewing the references of retrieved articles. Last search was conducted on 20 August 2021.

Results and conclusion:

A total of 943 titles were retrieved. After removing duplicates, applying inclusion and exclusion criteria, finally eight studies were included in this review. Out of eight studies included, there were three randomised controlled trials, one cohort study, two case series, one case study and one experimental study

There was substantial evidence on VersaJet™ hydrosurgery system for debridement. However, some studies have high risk of bias due to inappropriate randomisation sequence generation and selective measurement of the outcome, hence varying the quality of the included trials. Nevertheless, the evidence showed that VersaJet™ may reduce the healing and operative time to treatment, improve quality of scar or dermal plane efficacy, and optimise the need for grafting.

As per safety, the VersaJet™ hydrosurgery system may reduce the blood loss and transfusion, and decrease the infection rate. Even though there was one serious adverse event and some mild or moderate adverse events were reported, none of them were related to VersaJet™ hydrosurgery system. The latest version of VersaJet™ hydrosurgery system had received 510(k) from United States Food and Drug Administration and was Conformité Européenne (CE) marked in 2011 before launched in 2012. The hydrosurgery system also had been approved by Medical Device Authority Malaysia in 2018.

There was no significant difference between the two groups in terms of cost of the first operative procedure, cost of surgical procedures during the study, cost of study treatment or cost to achieve stable wound closure. Approximately, the price for one set of the latest version of VersaJet™ hydrosurgery system was [REDACTED] (United States Dollars).