

How Limited Access Dressing is an Effective Tool for Limb Salvage in Diabetic Patients?

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The increasing rate of diabetes all around the globe is a major concern today. As far as limb amputation is concerned, diabetes around the globe results in one major limb amputation every 30 seconds, over 2500 limbs lost per day. In India alone, 40,000 amputations are performed annually [1]. In Saudi Arabia-gradually becoming a major Problem [2]. The CDC estimates that 23.6 million Americans currently have diabetes-7 percent of the U.S. population-up from 18.2 million in 2003 [3]. Diabetes-related amputations cost approximately three billion dollars per year (\$38,077 per amputation procedure) [4, 5]. With the rise of diabetes diagnoses, there is also an expected rise in the number of amputees.

CDC report finds large decline in lower-limb amputations among U.S. adults with diagnosed diabetes [http://www.cdc.gov/media/releases/2012/p0124_lower_limb.html]. The age-adjusted rate of non-traumatic lower limb amputations was 3.9 per 1,000 people with diagnosed diabetes in 2008 compared to 11.2 per 1,000 in 1996. Improvements in blood sugar control, foot care and diabetes management, along with declines in cardiovascular disease, are likely to have contributed to the decline in leg and foot amputations among people with diagnosed diabetes. This encourages us for

multidisciplinary care to save limb in place of amputate and replace with artificial limb.

Apart from control of diabetes and prevention of ulcer by foot care, there is needed to emphasize on early treatment of ulcer under cover of newer dressing methods. Newer dressings like moist wound healing, conventional continuous negative pressure dressing, calcium alginate dressing and silver impregnate dressings have promising results, but the treatment cost increases sharply. Combination of moist healing and intermittent negative pressure dressing like Limited Access Dressing (LAD) [6, 7] appears to be a better economical tool for limb salvage.

Problems of conventional surgical approach

When following ulceration, infection and tissue destruction (necrosis/ gangrene) debridement is done, along with dead tissue variable loss of amount of viable tissue in the process cannot be avoided. This may expose vital structures (tendon, bone, joint etc) and lead to desiccation of exposed tissue on conventional dressing methods. Vicious cycle of Re-debridement and tissue necrosis may set in that will lead to minor/major amputations.

Hence a logical approach may be ultraconservative debridement and protection of further necrosis by some means e.g. moist dressing.

Ultraconservative approach of LAD

To avoid the problems of excessive tissue destruction by conventional surgical approach, it will be advisable to preserve each and every viable cell initially followed by readjustment for better and efficient utilization of saved tissue during resurfacing/ reconstruction.

It will be advisable to make the viable cells/ tissue to proliferate and allow spontaneous separation from dead tissue. During this process of separation, the problem expected is harm due to uncontrolled diabetes, infection and toxic symptoms related to tissue necrosis. LAD [6] achieves spontaneous separation of dead tissue from viable tissue by autolysis (enzymes under moist healing during no negative pressure period) and mechanical debridement (due to negative pressure and LAD wash). LAD effectively controls infection (LAD plastic acts as a barrier to bacteria, Negative suction prevents wound invasion by microorganism, the tissue in focus e.g. fascial and peritendinous planes can be exposed to negative pressure by pacing a drain rather than wide surgical exposure), intermittent negative suction and moist healing both helps to promote granulation tissue and epithelialization. High risk of toxic features, MODS, MOF and death related to necrotic tissue/ wet gangrene is controlled by leech effect of LAD. Even problem of MDR in wound is solved to some extent as multi drug resistant organisms in wound are not resistant to the effect of negative pressure.

Predisposing factors for ulcerations like stiffness in deformed position may be better controlled by early physiotherapy in Limited Access Dressing.

Over all if there is unsatisfactory progress of the wound under transparent cover of the LAD, it can be easily detected by the surgeon for appropriate action.

Original Forecast that may turn out to be wrong

- Treating MDR wound infection is very difficult (organisms are not resistant to negative pressure of LAD).
- Hospital acquired infection is a severe problem (wound isolation in LAD bag may reduce the problem).

- Wet gangrene is often a surgical emergency (Leech effect of LAD, prevention and eradication of tissue infection by LAD has made this no more an emergency)
- Newer dressing techniques are costly and requires sophisticated equipments (LAD is economical)
- Exposed bone/ Tendon usually requires flap cover (growth of granulation in LAD may cover these structure avoiding complex reconstruction)

Problems yet to be solved

- Ultra conservative debridement is a slow process and needs to be made faster by combining with other technique e.g. debriding agents.
- In severely vascular compromised limb, vascularity is not expected to improve by LAD. In some cases vascular surgery (angioplasty/ by pass) followed by wound bed preparation and resurfacing under LAD is a better solution to vascular problems for non healing wounds.
- better regeneration and healing by intra LAD use of growth hormones, tissue culture medium and stem cells

References

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