

Vacuum Assisted Grafting and Closure of Problem Wounds

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Abstract

Introduction: Vacuum dressing has established its role in the treatment of problem wounds and may be regarded as an important tool for approaching such difficult wounds. We go a step further to state, that, vacuum assisted wound closure and skin grafting improves both the short term and long-term outcome of these grafts by significantly reducing the complications and improving graft uptake.

Aims and Objectives: The aim of this short series of cases was to explore, whether vacuum dressings over grafted problem wounds, or for that matter, approximation of even non grafted problem wounds, had any significant advantage over conventional grafting and dressings methods for closure of problem wounds and whether it should be included on a more regular basis for this part of the treatment of problem surgical wounds.

Materials and methods: Although, it is a short series of four cases, an attempt was made to include a range of challenging conditions which generally adversely affects the outcome in such problem wounds, faced in Plastic Surgery practice.

Conclusion: Concurrent use of vacuum dressings with skin grafting promises to improve both short term and long-term outcome of wounds in such problem cases. The benefits are both in terms of reduced hospital stay and reduced treatment cost.

Keywords: Wounds, Vacuum Dressings, Grafting and Closure.

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Introduction

Vacuum dressing has established its role in the treatment of problem wounds and may be regarded as an important tool for approaching such difficult wounds. Lister's famous saying, "Skin is the best dressing" may not hold true for some problem wounds, which may carry necrotic tissue, are contaminated/seriously infected and significantly devitalised.

Vacuum dressings come in handy in each of these situations to render the wound suitable to be treated with skin grafts or other reconstructive measures. We go a step further to state, that, vacuum assisted wound closure and skin grafting improves both the short term and long-term outcome of these grafts by significantly reducing the complications and improving graft

uptake, as a result significantly reducing the hospital stay and long-term frequent visits, thereby, saving both time and money as far as the treatment of such problem wounds are concerned.

Aims and Objectives:

The aim of this short series of cases was to explore, whether vacuum dressings over grafted problem wounds, or for that matter, approximation of even non grafted problem wounds, had any significant advantage over conventional grafting and dressings methods for closure of problem wounds and whether it should be included on a more regular basis for this part of the treatment of problem surgical wounds.

Materials and methods:

Although, it is a short series of four cases, an attempt was made to include a range of challenging conditions which generally adversely affects the outcome in such problem wounds, faced in Plastic Surgery practice. By problem wounds, we mean, such wounds, which, fail to respond to

conservative dressing methods and frequently require surgical interventions, in terms of minor/major debridements, even amputations and complex and/or staged reconstructive procedures and in some cases, a combination of these.

The observations were made regarding,

- a) Preoperative hospital stays
- b) Postoperative hospital stays
- c) Total hospitalisation time
- d) Cost of treatment
- e) Post discharge visits and complications

Observations were also made regarding differences in gross appearance of the graft bed in comparison to non-vacuum assisted graft beds.

Case-1:

A severely contaminated below knee stump with exposed bones, a paucity of soft tissues and a very short segment of below knee stump available for future use of prosthetics.



Here conservative dressing methods were not deemed suitable, and it needed a combination of extensive debridement and some microsurgical or other complex/staged reconstructive procedures.

Case-2:

A severe degloving and crush injury of right leg, sustained in a road traffic accident. There was circumferential loss of

skin of a large part of the leg and significant crushing of soft tissue and heavy load of contaminants and long segment of exposed bone (there were no associated fracture of the bone).



Conservative management of such wounds means a long hospital stay, need of many staged debridements and a risk of infection, soft tissue and skeletal tissue loss and a need of major reconstructive procedure later.

Case-3:

A neglected diabetic wound, a month old with foul smelling discharge and necrotic tissue load. The patient was also an elderly smoker with peripheral circulation deficiencies.



Conservative management often risks loss of toes in such cases and complex reconstructive methods are to be used very judiciously in these cases.

Conservative management also requires a long hospital stay, as dressings in these cases are best done under treating doctor's observation and concurrent medical treatment is also required, usually this is 3-4 weeks at a minimum and is frequently associated with some complications, mainly infections and is often extended even beyond this said period.

Case-4:

A non-healing ulcer (7-8 yrs. Duration, buzzing with maggots) on a leprotic foot with previous histories of multiple hospital stays and failed treatments.

A conservative approach requires an extended hospital stay and medical management which may extend from weeks to months, and frequently leads to noncompliance, which is evident from past history of this patient.

**Results:****Case-1:**

The patient was put up for a thorough debridement, all the necrotic and devitalised tissue were excised, drills were made in the exposed bony cortex and remaining healthy soft tissue were arranged over exposed bony segments, as much as allowed by the local tissue condition.

Vacuum dressings were applied concurrently by covering the wound with a single layer of betadine-soaked gauze piece and applying a sterile piece of medium density one inch foam, connected to a suction device to create the desired negative pressure by means of romo vac suction tubes and sealed airtight with ioban (betadine impregnated transparent airtight occlusive dressings).

The negative pressure of the system was maintained at 110-120 mm Hg.

The schedule for vacuum application was to apply it for 90 minutes followed by a 30-minute break and repeating this cycle over.

The dressings were opened on the 5th day and reapplied. On 10th day, patient's dressings were opened in operation theatre and after finding it suitable for grafting, split skin grafting was done. Care was taken to properly perforate the skin graft to facilitate free passage of serous and serosanguinous exudates from graft bed and care was also taken to properly fix the graft to the graft bed and margins by applying graft fixation and quilting sutures to minimise chances of graft dislodgement under negative pressure.

Vacuum dressings were applied concurrently. Dressings were opened on the 5th postoperative day, i.e., 15th day from the day of initial debridement and graft was found to be attached well to the surface with no significant sub graft collection.

Patient was kept for observation in the hospital for another 6 days and discharged with settled graft and healed donor site on 21st day following initial debridement.



Patient was able to use a prosthetic foot with some silicon padding's by the end of 2 months after initial injury.

- Preoperative stay- 12 days
- Post operative stay- 11 days
- Total hospitalisation time- 23 days
- Observations regarding cost. The entire cost of debridement, vacuum dressings and skin grafting required in this case were significantly less than any major reconstructive surgery or even less than disarticulation at knee, which would have been an inferior option due to loss of knee joint functionality.

- Post discharge visits were made at 3 weeks intervals for the first 3 months. No intermediate visits were required.

At patient's long-term visit at 6 months, compliance with prosthetic leg was satisfactory and no further treatment was required.

Case 2:

The patient was treated with extensive debridement and local muscle transposition to cover exposed bony segments. Skin grafting was done with above mentioned precautions.

A vacuum dressing was applied in the above-mentioned fashion, in the same setting.

Dressings were opened on the 5th post operative day and grafted bed was satisfactory.

Patient was discharged on the 12th post operative day with settled graft and satisfactory donor site healing.



- a) preoperative stay - 3 days
- b) Postoperative stay – 12 days
- c) Total hospitalisation time – 15 days
- d) Observations regarding cost: Less costly than a combination of staged debridement and reconstructive procedures, both in terms of hospital stay and number of surgical interventions required.
- e) Post discharge visits were made at 2 weeks intervals, at which time physiotherapist was started.

Patient required one more visit after 3 weeks to observe scar progress.

At long term visit six months post procedure, patient was ambulating well with no significant complains.

Case 3:

The patient was put up for debridement and concurrently vacuum dressings were applied.

Concurrent medical management and diabetic control was done.

Dressings opened on 5th day and marked improvements were observed. Vacuum dressings were reapplied and opened after 5 days, i.e., 10th day from the initial debridement and wounds were markedly improved, requiring no grafting, further management was done on conservative basis on an outpatient basis, which required weekly visits for first 3 weeks. The patient didn't turn up for long term visits.



- a) Preoperative stay – 10 days
- b) Postoperative stay – nil, as operation was avoided in this case.
- c) Total hospitalisation time – 10 days.
- d) Observations regarding cost: The benefits are obvious in this case as the need of surgical interventions was completely avoided by proper applications of vacuum dressings.
- e) Patient was not available for long term visits in this case.

Case-4:

Thorough debridement was done, and tissue sent for histopathology, which were found negative for AFB subsequently.

Vacuum dressings were applied concurrently.

Wound was opened on 5th day and was found covered with healthy granulation tissue. Skin grafting was done using our standard precautions for graft perforation and fixation.

Vacuum dressings were applied over graft, using same technique and schedule.

Dressings were opened on the 5th day and graft was found well attached to the bed.

Patient was kept for further one week and discharged 12 days after the procedure with a settled graft and a healed donor area.



- a) preoperative stay – 8 days
- b) Postoperative stay – 12 days
- c) Total hospitalisation time – 20 days.
- d) Observations regarding cost: in addition to being cheaper than a combination of complex debridement and reconstructive procedures, it also helped in improving compliance in this patient, who had multiple histories of interrupted treatments.
- e) Post discharge visits were made at 3 weeks and patient was referred to Dept. of Physical medicine and rehabilitation for physiotherapy and appropriate footwear.

Long term results are still awaited as this a relatively recent case.

Observations regarding gross appearance of grafted area:

- a) Blisters or pockets of serosanguinous fluid were minimal.
- b) Once the discharge-soaked foam is removed, graft bed was free from any foul smell.
- c) The graft itself, appears a bit wrinkled, although, well attached to the underlying bed.



(Appearance on day 5, after removal of vacuum dressings, case 2 and case 4, respectively.)

Discussion:

Role of vacuum dressings is accepted beyond doubt in treating any problem

wound, which is difficult to manage by means of conservative dressings.

Vacuum dressings benefit the wound by

- A) Keeping the wound free from exudate, thereby discouraging bacterial colonisation and infection.
- B) Improves general micro-circulation in the area.
- C) Improving oxygenation of tissue and,
- D) Promoting deposition of growth factors and thereby promoting fibrogenesis and angiogenesis in the wound.

In addition to the above-mentioned roles, vacuum dressings were also observed to help in skin grafting of such wounds by ensuring no sub-graft collection and thereby ensuring a safe outcome of skin grafting in such problem wounds which otherwise might have required multiple complex and/or staged reconstructive interventions.

Conclusion:

Concurrent use of vacuum dressings with skin grafting promises to improve both short term and long-term outcome of wounds in such problem cases.

The benefits are both in terms of reduced hospital stay and reduced treatment cost.

This merits further study and comparisons to evaluate, whether it should be employed more regularly and adopted as a treatment protocol for such problem wounds.

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