*Original Article*

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# The Role of Negative Pressure Wound Therapy with Instillation and Dwell Time, in the Management of Venous Ulcer

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**Abstract**

The negative pressure wound therapy with instillation and dwell time (NPWT-id) is a method which is useful as an adjunct in the management of venous ulcer. This an effective method to treat the wounds with active infection. NPWT id is effective in preparing the wound bed with a lesser number of dressing changes and comparatively lesser treatment cost.

***Overview:*** A case report about venous ulcer bed preparation with the help of NPWT-id.

**Keywords:** Venous Ulcer; Negative pressure wound therapy with instillation dwell time; NPWT-id; Ionic silver solution; wound bed preparation.

## INTRODUCTION

Negative pressure wound therapy is a time tested method of managing wounds. Its efficacy in preparing any wound for the definitive treatment or its role as a bridging procedure is well known. But the modifications of negative pressure wound therapy is comparatively new. It can be combined with oxygen, then it is known as RONPT (regulated oxygen negative pressure wound therapy), or can be combined with various medicated solutions, then it is known as negative pressure wound therapy with instillation and dwell time.

Recently we came across in the literature the negative pressure wound therapy with instillation and dwell time and its role in the wound bed preparation. In this article, we shall discuss our experience of using negative pressure wound therapy with instillation and dwell time in preparing a raw area over amputation stump for definitive wound cover.

## MATERIALS AND METHODS

The study was conducted in Department of plastic surgery at a tertiary care center. This study was conducted after getting informed consent and getting ethical committee clearance. The study detail is as follows.

A 50 years old female patient with no known co-morbidities was admitted with infected raw area

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over the left leg. Initially the patient was treated with conventional wound therapy; wound irrigated with normal saline, swab taken for culture and sensitivity, thorough debridement of the wound followed by conventional dressing. The patient was treated with parenteral antibiotics based on

**Fig. 1:** Infected Venous Ulcer Left Leg

exudate culture and sensitivity reports. But the wound was not responding well and the dressing needed frequent change (fig. 1). So a decision to give a trial NPWT-id for wound bed preparation was made.

Negative pressure wound therapy was applied with the help of sterile polyurethane sponge and two tubes. The tubes were inserted longitudinally into the sponge. Before NPWT-id, the wound was thoroughly debrided and meticulous hemostasis was achieved. Then the wound was covered with a sterile Vaseline gauze. The sponge with tubes was placed over the Vaseline gauze, and held in position with the help of a transparent occlusive dressing. One tube was dedicated to negative pressure and other for the antimicrobial solution instillation (fig. 2).

**Fig. 2:** NPWT-id dressing

The antimicrobial solution used was ionic silver solution. The amount of solution to be instilled each time was decided as the amount of solution required to wet the sponge completely and up to the point when the transparent occlusive covering just begin to lift. Negative pressure was applied at 125mmHg. The wound was bathed with ionic silver solution and it allowed to stay in the wound for 10 minutes, after every 2 hours of negative pressure application. This was continued for 1 week. The dressing was opened at the end of 1 week, wound was washed with normal saline, exudate swab was taken, fresh debridement was done, and a new dressing was applied. This was repeated for the next 3 weeks.

## RESULT

By the end of third week, the wound became clean, fully covered with healthy granulation and the wound bed was ready to undergo the definitive wound cover procedure, the patient underwent STSG. (fig. 3)

**Fig. 3:** NPWT-id connected to the Vaccum source in ward

**Fig. 4:** Well granulated wound bed

**Fig. 5:**

## DISCUSSION

The venous ulcer is an entity which is well known to have a long downtime to heal. Venous ulcer usually requires months to heal. This convalescent period adds the cost of treatment and it puts immense stress on to the patient and bystanders, as wells as on the health care providers. The negative pressure wound therapy with instillation and dwell time (NPWT-id) is a method, which is a known to decrease the downtime to prepare the wound for grafting or flap cover.

The concept of negative pressure wound therapy was described in 1997.[1–3] The devices used for Negative pressure wound therapy described by Argenta and Morykwas.[1] consists of a highly porous polyurethane sponge, a semipermeable dressing, connecting tubes, and a vacuum source.

The negative pressure wound therapy with instillation and dwell time is an improvisation of already known NPWT. Along with sub-atmospheric pressure application over the wound, antimicrobial solution instillation is done after every 2 hours of negative pressure. The sub-atmospheric pressure is cut off and the solution is allowed to dwell in the wound for a minimum of 10 minutes. It has been reported that intermittent negative pressure has an upper hand over continuous negative pressure in wound bed preparation.[4,5] The sub-atmospheric pressure applied was 125 mmHg as described by Morykwas et al.[4,5] it is suggested that pressures that are lower or higher than 125 mmHg result in a significant decrease in the formation of granulation tissue. The wound is also instilled with antimicrobial solution or normal saline. There are diverse views on the ideal solution for wound instillation. There is also no definite consensus on effective dwell time for antimicrobial solution in published literature. But in vitro studies evaluating the effect of various antimicrobial/antiseptic solutions on various types of bacteria and yeast suggests that contact >10 minutes is effective in decreasing microbial load.[6,7] It is also difficult to suggest an ideal volume of instillation solution because with variations in size, depth, and shape of the wound the fluid needed to get a complete bathe of the wound may vary. Too much solution will interfere with the occlusive dressing and lead to negative pressure leak; it will also produce maceration of the surrounding tissue. While lesser volume of solution, can be insufficient to bathe the entire wound surface. Therefore, any recommendation for an absolute volume of solution is not practical. The widely accepted recommendation is based on visual assessment, i.e. to instill the solution and watch for the foam until it is completely wet and the size increase of sponge begins to lift the transparent occlusive dressing.[8]

## CONCLUSION

The NPWT-id is an effective bridging procedure to prepare the wound for definitive wound cover; at a lesser downtime, with minimal number of dressing changes, at a lower treatment cost[9] but it is not a replacement to excisional debridement. It helps in minimizing the downtime of healing a

venous ulcer, minimizes the number of dressing changes, cuts the treatment cost and thus reduces the sufferings of the patient. The limitation of this study is that it was done on a single patient. so it is difficult to draw a definite conclusion. More definitive data can be made only after a large randomized control study.

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