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# Negative pressure wound therapy: A clinical study on its efficacy and effectiveness in the treatment of wound in plastic surgery Department

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**Abstract**
Wound and their management are fundamental to the practice of surgery. From practical point of view wounds are classified into tidy wound and untidy wound by Rank and Wakefield. A clinical prospective study was done in the department of plastic surgery, GMCH, Assam for a period of one year from June 2015 to June 2016 on negative pressure wound therapy: a clinical study on its efficacy, cost effective and use in the treatment of wound in plastic surgery. Patients who had either acute or chronic wound were included. Exclusion criterias include exposed vessels, uncontrolled diabetic, wound containing malignant tissue and patient refusal. A total of 10 patients were included in the study and it comprises of 4 female and 6 males. There were 2 chronic wounds and 8 cases of acute wound. NPWT plays an important role in the wound management and helped in the wound healing. It reduced the hospital stay and improved quality of life and patient compliance and thereby the cost of treatment.

**Keywords:** NPWT, Wound, Debridement

## 1. Introduction
Wound and their management are fundamental to the practice of surgery [1]. The management of wounds has presented a long standing challenge to health care practitioners and need various methods to achieve healing. From practical point of view wound are classified into tidy wound and untidy wound by Rank and Wakefield. Usually tidy wound is closed immediately and expected to be healed by primary intention. Untidy wound are caused by crushing, tearing, avulsion, vascular injury or burns and contained devitalised tissue.
Negative pressure wound therapy is a mode to managed wound and prepare the wound either for early grafting and flap coverage.

## 2. Aims of the study
To evaluate the efficacy and effectiveness of NPWT in the treatment of wound in plastic surgery.

## 3. Materials and method
A clinical prospective study done in the Department of Plastic Surgery, GMCH, Assam for a period of one year. Patient with acute wound with extensive soft tissue loss and chronic non healing wound were included. Antiseptic dressing and surgical debridement was done to untidy wound with extensive necrotic tissues prior to NPWT application. The negative pressures were set at 125 mmHg on continuous therapy and canister was connected to collect the exudates. Dressings were change after every 3-5 days depend upon the collection in canister. Exclusion criteria included were exposed vessels, uncontrolled diabetic, wound containing malignant tissue and patient refusal.

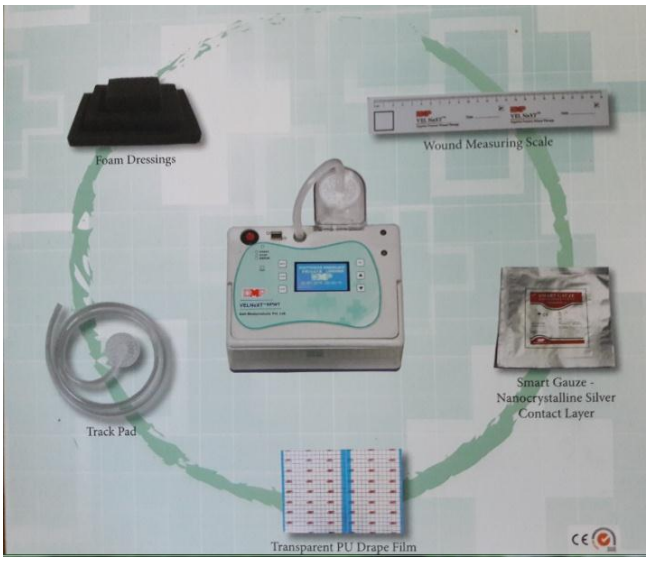


**Fig 1:** Components of NPWT being used at our department.

## 4. Results
Total 10 patients who were included in the study of which 4 were female and 6 males. The age ranges from 18- 70 years. There were 2 cases of chronic wounds and 8 acute wound. Wound sites were 3 at thigh, 4 at the leg, 2 at sacral region and 1 at forearm.

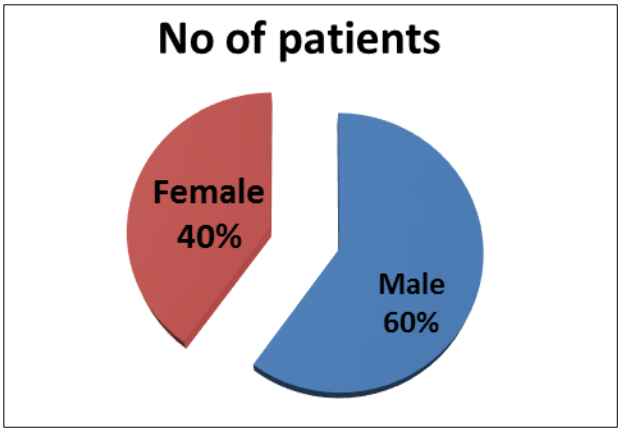


**Fig 2:** Sex distribution

**Table 1:** Age distributions.

| Age in years | No of patients |
|---|---|
| 18-30 | 3 |
| 31-40 | 3 |
| 51-60 | 2 |
| 60-70 | 2 |

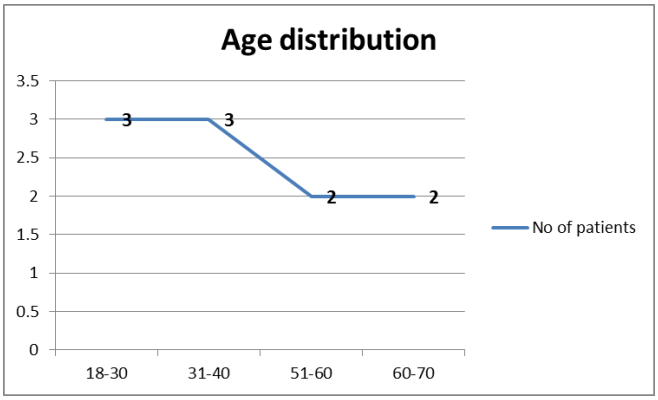


**Fig 3:** Graph showing age distribution.

**Table 2:** Different types of wound in this study

| | |
|---|---|
| Acute wound | 8 |
| Chronic wound | 2 |

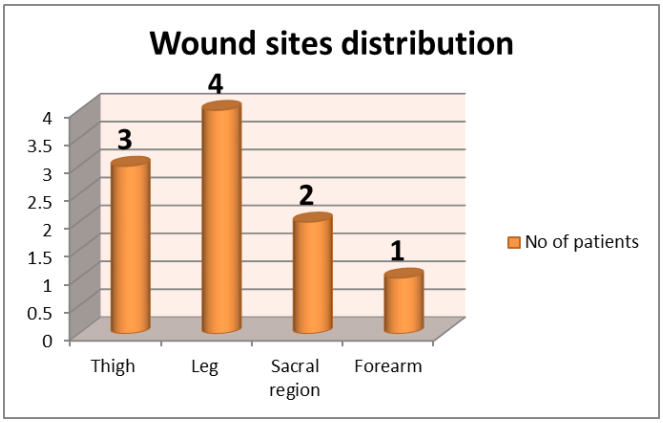


**Fig 4:** Distributions in different sites of wound.

The dressing was changed after every 3-4 days except for two patients in which dressing were changed after 2 days due to excessive exudates. Average duration of therapy was 8 days.

Pain associated with the implementation of the NPWT was rated 3 from 10 with ranges from 3-5 in Visual Analogue Pain Scale. 1 patient died of MI after NPWT applications. All NPWT treated patients were split skin grafted at the end. The hospital stay was 21± 5 days.

**Fig 5:** Acute wound due to RTA, before and after instillation of the NPWT

**Fig 6:** Wound after post NPWT and post SSG 2 weeks later

**Fig 7:** Post burn sacral pressure sore before and after application of NPWT

**Fig 8:** After 1st and 2nd NPWT, appearance of the wound

**Fig 9:** Post trauma wound with exposed implant

**Fig 8:** Application of NPWT on medial and lateral aspect of leg defect.

**Fig 9:** After 3 NPWT therapy

## 5. Discussion

The wound management start from the time the patient enter the emergency. Thorough cleaning of the wound, antibiotic coverage and active pain management are the mainstay of the treatment. There are different approaches of wound management ranges from anti-septic dressing to aggressive surgical debridement. Negative pressure wound therapy (NPWT) is a newer method for wound management. It was first described by Charikar as an experimental technique for treating subcutaneous fistula but it was the clinical work by Argenta and Morykwas a decade later that allowed NPWT to gain recognition as a useful clinical tool for managing complex and difficult wounds [2-4]. NPWT, also referred to as vacuum-assisted wound closure, is the wound dressing system that applies continuous intermittent sub-atmospheric pressure to the surface of a wound [5].

Mechanism of the action of NPWT:

1. Closed system reduce wound oedema
2. Suction canister remove exudates and those improves oxygenation to the cells
3. NPWT also diminishes mediators of the inflammatory response and improve angiogenesis.

In developing country it is mostly the cost of the NPWT that matters but in compared to the hospital stay and loss of working day and quality of life, NPWT plays a vital role. NPWT benefits include rapid wound granulation, epithelialisation and contraction [7], reduction of dressing changes [8], reduced infection risk [9], reduced treatment costs [10], control of exudate [11], concurrent rehabilitation [12], and better patient tolerance [13]. In our study most of the dressing were change after every 3-4 days which is same as the study done by Rozen *et al*. Successful outcome is heavily dependent on all treatment modalities including adequate wound debridement, appropriate antibiotic therapy, optimization of healing markers, and meticulous wound monitoring [6].

## 6. Conclusion

NPWT enhances process of wound healing. The need of flap coverage has been converted into SSG after NPWT. It reduces duration of hospital stay. It is cost effective by reducing frequency of dressing changes, duration of wound healing and man-power requirement. Hence NPWT is effective method of wound management to downgrade the complicated wound into simplified.

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