

**DESIGN OF LOW COST VACUUM ASSISTED CLOSURE WOUND THERAPY**

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**ABSTRACT**

In recent years, combining instillation of a cynic wound solution with (VACWT) has facilitated wound cleansing. Furthermore, published studies have positively reported on the use of a VACWT system with automated instillation and a dwell time (VACWT) that provides a method of cyclically instilling topical solutions to help improve recovering of acute and chronic wounds. Our purpose was to analyze the outcomes of patients who received adjunctive VACWT with wireless with moderate usage and Poly Hexanide solution to given Surgical Site Occurrences (SSO), The following first stage expander-implant to the breast reconstruction. A Wound Vacuum System has Serval parts. A form or gauze dressing is dressed on the wound. It covered by adhesive film covers the dressing and wound. The tube leads from under the adhesive film and connects to a portable vacuum pump. This pump removes air pressure over the wound. It may does this either constantly or cycles

**Keywords:** working of VACWT, history of VAC therapy, methodology, reverse engineering, uses of V.A.C

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**1.INTRODUCTION**

In the present world there is a rapidly increasing of diabetic ad geriatric population. Vacuum assisted closure wound therapy (VACWT) is the been applied for controlling vacuum source to an open wound. Vacuum assisted closure wound therapy will be a device with has been designed to overcome negative pressure wound therapy and it is very though job for the doctors to diagnoizes the chronic wound for the patients and Vacuum assisted closure wound therapy can help to heal the wound as much faster .The main motto of VACWT is to cure difficult wounds. By using Vacuum doctors can keep more focus on patients with the help of canister Identification. A special care is been given to human and economic cost, It was mainly developed for overcoming the problem's in NPWT the simplified .The main aim for making this machine is to increase the life span of human's and also the Vacuum device. The VAC dressing must be changed once every 48-72 hours, but not more than

three time a week.

## **2.WORKING OF VACWT**

VAC is a treatment which uses Negative Pressure or Vacuum Pressure for dressing. This treatment help's for healing the wound. This therapy consist of following components which play's a main role 1)Canister to hold fluid 2) Sensa TRAC 3) A Foam dressing 4)Low pressure (around -20 to -220mmHg )the pressure is based upon the depth and size of the wound .The dressing for the wound VACWT process undergoes up to 72 hours the hours of working of this therapy is based upon the wound's depth and size. The pressure which is been applied to the wound are been analyzed. The parameters which have been used are been verified and analyzed properly. The reverse engineering is made on the current VACWT and the various parts are analyzed.

## **3.HISTORY OF VAC THERAPY**

In early 1990 Louis Argenta , MD found the invention for diabetic patients with bedsores he was professor in plastic and reconstructive surgery department with the help of Michael Morykwas who was a bio engineer they joined together for inviting a new device for diabetic patients, They got success in it and they named it as Vacuum Assisted Closure Wound therapy device . Since from 1991 V.A.C place a major role in the treatment for diabetic patients by using this therapy the life span are been increased even large wounds can be healed faster.

## **4. METHODOLOGY**

The methodology is used in design of low cost Vacuum assisted closure wound therapy found the healing process of wounds followed by reverse engineering on the device, then to study the functionality of the existing component. After this compare of NPWT in order to develop into a Working model study the parameters. This methodology helps to but model study the parameters. This methodology helps to build a low cost VACWT device.

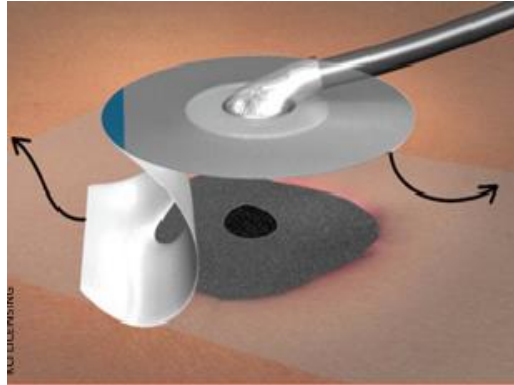
## **5. REVERSE ENGINEERING**

To observe the design of Vacuum Assisted Closure Wound Therapy is to study the current existing device NPWT. There is a pressure regulator which is been attached to the inlet of the suction which is used to help them maintain the region within a desired pressure(180mm of the mercury). The kit consist of PCB Board which plays a major role in the maintained of desired pressure throughout the process of healing.

## **6. USES OF V.A.C.**

V.A.C Therapy can be used for both clinical purpose and even in the commercial usage as with any other therapy each patient must have an individual

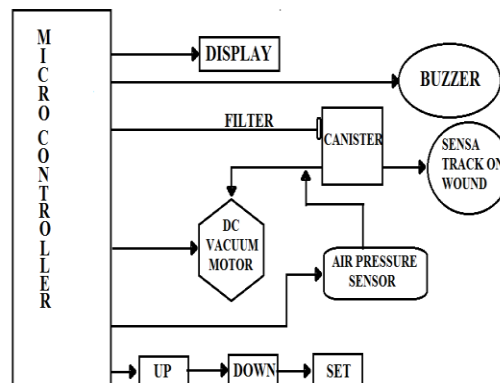
assessment of the wound V.A.C place a major role and it should be used with caution, and patients with bleeding wounds or difficulty in maintaining homeostasis and those taking anticoagulants should be noted continuously till the treatment gets over. The V.A.C. Therapy should not be directly placed in the wound. The treatment should be used with move caution, the patients who under goes this treatment during maintaining haemostasis and while taking anticoagulant must be monitored as per the instructions.



## PARAMETERS

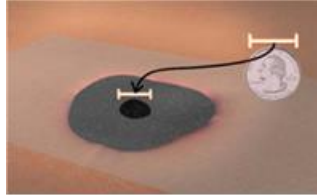
The parameters which are been present for developing the Vacuum Assisted Closure Wound Therapy and they are listed below

1. Dressing
2. Pressure sensor
3. Microcontroller (pic 16f877a)
4. LCD Display
5. Lithium Battery
6. Canister



### **Dressing**

The dressing is the preliminary process in wound healing method. Take wound measurement as per the size of wound the dressing would be selected. By the reference of local guidance 0.9% sterile with sodium chloride are been applied on the wound foam is cut by using scissor. The foam is been placed on to the wound after that sensa T.R.A.C. pad where been used to cover the wound.



### **Pressure sensor**

A pressure sensor is a device that senses and measures pressure, usually this type of sensors are mainly measuring the gases or liquids. The pressure sensor acts as transducer when they are been connected with integrated circuit, it replicates (In the form of an electrical signal) the signal of imposed pressure is received by the function.

### **Micro controller pic (16f877a)**

Pic is usually known as peripheral interface controller. 16f877a is the 40pin controller and Pic says its classification. It uses EEPROM which is possible to store data permanently. Pic16f877a is a controller which undergoes flash memory technology. In this there are 40 pins among that 33 can act input and rest of the seven can be as output. Its ranges from the 6-pin SMD, 8-pin DIP chips is upto 144-pin SMD chips, and also the discrete I/O pins, ADC and DAC modules, and communications ports such as UART, IIC, CAN, and even USB.

### **LCD display**

LCD – Liquid Crystal Display LCD works on the principle of locking light rather than emitting light. LCD uses liquid crystal properties this liquid crystal does not emit light directly instead of that it behaves as back light or reflector to produce the image neither in color nor in monochrome. LCD under goes 7Segment display as in a digital clock

### **Lithium battery**

Lithium battery are the primary batteries that have anode for reaction. The main use for this battery is it can be rechargeable one. Lithium cells can provide the voltage from 1.5V to above 3.7V lithium batteries are widely used in portable electron devices. In normal the color of lithium battery would be silvery-white that would change as gray. Lithium battery has a low melting point among all the metals. It has low density which is  $0.534 \text{ g/cm}^3$ .

### **Canister**

During the process of Vacuum Assisted Closure Wound Therapy the waste particles as been stored in box which is named as canister. In before technology there is no indication for canister in this technology there is a sensor for indicating the waste fluid in the canister

## **7. RESULT AND DISCUSSION**

### **RESULT**

Wound contraction was more pronounced with IPT and VPT than with continuous VACWT. When VACWT was applied in the continuous mode, immediate contraction of the wound was seen, which was maintained for the remaining 72 hours. A different pattern of contraction was seen with IPT and VPT. When negative pressure was applied, there was immediate wound contraction, followed by a gradual decreasing wound area over time.

### **DISUSSION**

Intermittent Vacuum pressure therapy has previously been shown to lead to the formation of faster formation of granulation tissue and accelerated healing. However, the treatment has been hampered by the problem of patient pain resulting from the sudden changes in pressure, when going from subatmospheric to atmospheric pressure. The Variable pressure therapy is an interesting alternative that ensures smooth transitions between 2 different levels of negative pressure and thus relieve patient pain, while retaining the acceleration in healing. In IPT, the pressure is frequently turned on and off, while in VPT the pressure is changed cyclically between 2 different levels of negative pressure, thus the negative pressure environment is maintained throughout the therapy. This is a controlled, detailed study of the effects of IPT and VPT on contraction

## **8.CONCLUSION**

Classical electric VACWT pumps require a consistent power source to supply a vacuum. System inefficiencies, such as air leaks, require a greater input of power for

the desired function (200-watt maximum, 50– 60 Hz electrical supply). Also, current battery life in the portable units is well below 24 hour The foremost dilemma is cost. This high cost may be partially attributed to digital readout screens, microprocessors to regulate vacuum strength in compensation of air leaks, and the need for a trained medical professional to apply the system. Even in the developed world, VACWT devices are widely considered to be too expensive for the treatment of minor wounds.

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