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Research Article

Vacuum Assisted Syringe System (V.A.S.S. Device): How to Manufacture it Step by Step

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Abstract

We present a versatile craft design of an ambulatory wound treatment system, easy to build with low cost manufacturing and non dependent energy, to promote and facilitate the prompt wound closure and patient rehabilitation.

Introduction

The concept of vacuum in a wound was first presented by Evangelista Torriculli; it was not until 1993 that Fleischmann described the technique of covering a wound with a sponge, connecting it with a suction device and covering it with a plastic material to after generating a vacuum. Later in 1995 the VAC system was approved by the FDA and in 1997 Dr. Louis Argenta and Michael Moryk was published their clinical experience with this system showing good results [1].

It is well known some VAC benefits like decrease wound bacterial burden, promote graft healing and acellular matrices [2], increase the local leucocyte migration, provides the quickest method of preparing a wound bed for healing, decreasing the wound size and swelling [3]. It is an energy dependent device which requires medical consumables such as sponges, as well as reservoir for detritus [4]. It also requires training by the personnel to place it and must be replaced at least every 48 hours. The last determines an inaccessible tool in rural areas of developing countries and unattainable in places where there is no electricity (war zones).

Materials

Sterile sponge, steri drape, gloves, 20cc luer lock syringe, Mayo scissors, IV Venoset, nasogastric tube, 3-way stopcock, tongue depressor (Figure 1).

Method

1. Manufacture a wound custom sponge, leaving a 0.5 cm of free space, between the borders of the wound and the sponge to enhance wound contraction (Figure 2).
2. Put over the wound and sponge an adhesive drape covering it within 10 cm of free margins of tape, beyond edges of the wound.
3. Make a window (4 cm diameter) over the sponge removing the adhesive just in that site, then create a shaft of sponge in which will be introduce the drain tube.
4. Put the sponge with the tube on tap of the first allocated sponge and then cover it with another sheet of drape. To avoid air leaks create a double cover in encountered "L" shape around the tube. Finally, put the last sheet covering the draping zone.
5. Connect the tube with the syringe and make suction until you notice the collapse of the sponge and wound retraction. This will be easy using the 3 way stopcock.

Figure 1: V.A.S.S. consumables.

Figure 2: Right leg V.A.S.S. (look the sponge collapse).

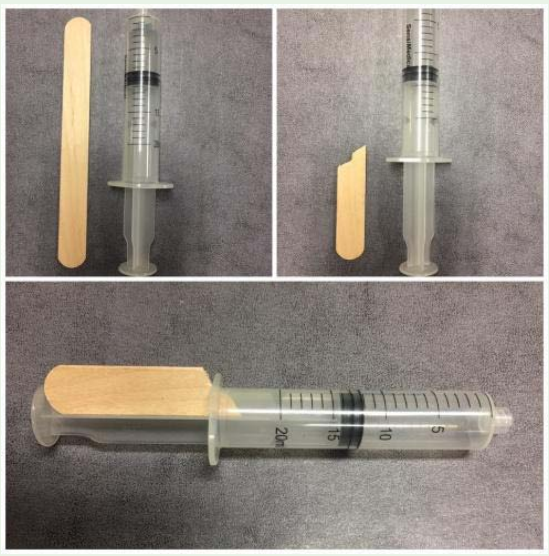

Figure 3: Tongue depressor as a trap.

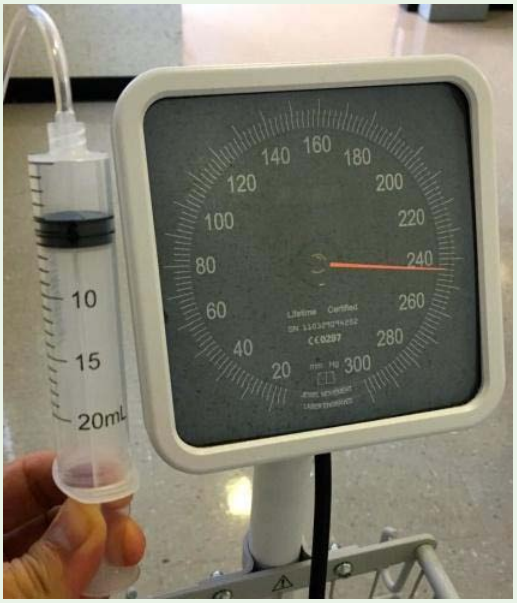

Figure 4: Manometry study (-60 mmHg/ 5 mL suction).

6. To irrigate the wound, use antiseptic solution just putting enough to fill the wound via the 3 way stopcock with a second syringe to drain it.

7. To ensure negative pressure in the device we introduce a tongue depressor as a trap (Figure 3).

If the patient needs to remove the syringe for any cause, just block the stopcock leaving the negative pressure.

Discussion

The VAC system is known internationally for its great benefits in the management of acute, chronic and infected wounds [5-8].

There is no doubt that it has made great progress in the treatment of wounds, but due to its technology and high cost is not available for all patients, especially in developing countries, isolated and marginalized regions , poor or war zones [9]. It also requires other specialized materials such as sponges or adhesive covers and a special drainage device [10]. All this makes a high cost device with the need for energy and supervision by medical personnel in case of system dysfunction.

Due to these considerations, we have emulated a vacuum assisted system no energy dependent, with low cost disposable items for manufacture and with a non incapacitating outpatient treatment.

In a first stage we performed manometry studies to determine the pressure to be exerted on the wound finding that we could reach with a 20 cc syringe the same pressure as the VAC device (Figure 4). That is the reason why we have determined that to reach 100 mm Hg it is necessary to aspirate at least 5cc in a 20cc syringe and keeping a hermetic closed form will generate the same results as the VAC system.

The V.A.S.S. works under the same vacuum principle while retaining the same virtues of the V.A.C. system can also be transported

and continue the care of the wounds from the home without relying on energy, being able to perform wound healing anywhere and with a low cost.

We consider this devise a good and cheap alternative tool, easy to make within any health medical center and with excellent results just like the V.A.C. system.

Conclusions

This revolutionary device will help a lot of patients all over the world in marginalized areas, to treat difficult wounds with a simple technique at a low cost, with no energy dependence, ambulatory, self dependent and achieving excellent results.

References

1. Argenta LC, Morykwas MJ. Vacuum-assisted closure: a new method for wound control and treatment: clinical experience. Ann Plast Surg. 1997; 38: 563-576.
2. Scherer LA, Shiver S, Chang M, Meredith JW, Owings JT. The vacuum assisted closure device: a method of securing skin grafts and improving graft survival. Arch Surg. 2002; 137: 930-933; discussion 933-934.
3. Morykwas MJ, Argenta LC, Shelton-Brown EI, McGuirt W. Vacuum-assisted closure: a new method for wound control and treatment: animal studies and basic foundation. Ann Plast Surg. 1997; 38: 553-562.
4. Dorafshar AH, Franczyk M, Gottlieb LJ, Wroblewski KE, Lohman RF. A prospective randomized trial comparing subatmospheric wound therapy with a sealed gauze dressing and the standard vacuum-assisted closure device. Ann Plast Surg. 2012; 69: 79-84.
5. Pesonen LO, Halloran BG, Aziz A. Prophylactic Groin Wound Vacuum-assisted Therapy in Vascular Surgery Patients at Enhanced Risk for Postoperative Wound Infection. Ann Vasc Surg. 2017; S0890-5096: 30904-30914.
6. Kantak NA, Mistry R, Varon DE, Halvorson EG. Negative Pressure Wound Therapy for Burns. Clin Plast Surg. 2017; 44: 671-677.
7. Lo Torto F, Ruggiero M, Parisi P, Borab Z, Sergi M, Carlesimo B. The effectiveness of negative pressure therapy on infected wounds: preliminary results. Int Wound J. 2017.
8. Acosta S, Björck M, Wanhainen A. Negative-pressure wound therapy for prevention and treatment of surgical-site infections after vascular surgery. Br J Surg. 2017; 104: e75-e84.
9. Webster J, Scuffham P, Stankiewicz M, Chaboyer WP. Negative pressure wound therapy for skin grafts and surgical wounds healing by primary intention. Cochrane Database Syst Rev. 2014; CD009261.
10. Perez D, Bramkamp M, Exe C, von Ruden C, Ziegler A. Modern wound care for the poor: a randomized clinical trial comparing the vacuum system with conventional saline-soaked gauze dressings. Am J Surg. 2010; 199: 14-20.