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Case Report

Regulated Oxygen-Enriched Negative Pressure Therapy (RONPT) in Lymphedema - Our Experience

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Abstract

Lymphedema is a menacing problem in our country. There are various modalities of treatment both medical and surgical which individually have not shown to be as effective as they have in conjunction has been proved to be effective. In most of the patients there is need for multimodal approach. One of the methods used is negative pressure wound therapy for healing of the chronic wounds in affected limb. We have used Regulated Oxygen Negative Pressure Therapy (RONPT) which has the added advantage of reducing the anaerobic organisms in the wound along with the negative pressure therapy and would like to share our experience.

Our Google search has not shown any previous use of RONPT for lymphedema.

Keywords: Lymphedema; Regulated oxygen enriched negative pressure therapy; Complex decompressive therapy

Introduction

Lymphedema is a significant problem and an important cause of lower limb swelling [1]. Infective aetiology is the most common in our country. It's a chronic disease with not just physical and psychological problems but also a social and financial burden. There are various treatment options available to control the swelling and prevent infection.

Both medical and surgical modalities are available, including Complex Decompressive Therapy (CDT), Compression garments, massage, elevation, exercise, Low level LASER therapy. Various drugs have been used both to treat the primary infection, prevention of secondary infection and to reduce the limb circumference such as diethylcarbamazine/albendazole, diuretics, benzopyrones, and various antibiotics (to treat and prevent secondary infections). Surgical treatment includes both physiological and reductive/ablative procedures [2].

Careful selection of patients for surgical procedure should be done, as physiological surgical procedures require the patient to have adequate CDT both pre-operatively and post-operatively.

However, for performing CDT all active infection has to be controlled. Even though antibiotics can be used for acute infections, chronic infections and non-healing wounds require additional modalities.

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One such modality is the use of RONPWT, which we would like to discuss in this case study.

Case Presentation

We present a case study of a 29 year female patient admitted in plastic surgery department in the month of august 2019, with h/o swelling of the left lower limb since 16 years. On assessment and thorough evaluation, the patient was diagnosed with chronic primary lymphedema of left lower limb with secondary grade 7 skin changes (WHO grading) (Figure 1) with multiple fissures over the affected limb. She also had foul smelling serous discharge from the limb. Patient underwent treatment with Regulated Oxygen Enriched Negative Pressure Therapy (RONPT) with one litre/min of oxygen infusion for 15 minutes every 6th hourly with negative suction maintained at 125 mm of Hg continuously for 24 hours. This dressing is changed once every three days for inspection of the wound. Along with the RONPT, multimodal treatment of the affected limb including regular limb washes, limb elevation, and compression dressings, over a period of 15 days was continued (Figures 2 and 3). RONPT was applied for all the three month period she was in the hospital.

Figure 1: Stage 7 skin changes with infection.

Figure 2: Use of RONPT.

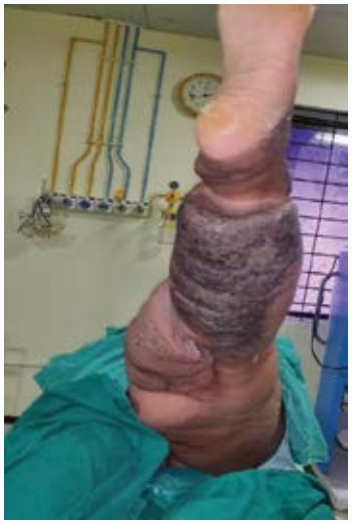

Figure 3: Healed fissures.

Results

In our patient we have observed that there is reduction in the infection and there was no further episode of infection noted over a period of 3 months the patient was in hospital. Further we also noticed a reduction in the size of the limb.

Discussion

Negative pressure wound therapy is used in the treatment of chronic wounds. The indications have expanded over a period of time to traumatic wounds and also skin graft recipient site. Recently, it has been used in incision wounds [3]. There are various modifications including infiltration which have made it a very versatile system with a wide range of use (V.A.C.ULTA™ 4 Therapy System).

NPWT involves the controlled application of sub-atmospheric pressure. It can be used as a bridge to help in wound closure by secondary intention. It has improved exudate management over conventional dressings, improving patient comfort, and reducing costs [4,5]. It may also improve the microcirculation and reduce the tissue inflammatory response. NPWT promotes wound healing through inducing cell proliferation and migration while inhibiting epidermal development and maturation [6].

Regulated oxygen-enriched negative pressure therapy acts similar to the negative pressure wound therapy but allows for intermittent oxygenation of the wound. *In vitro*, studies have shown that the use of regulated oxygen-enriched environment has reduced the anaerobic infections [7]. This helps in faster healing of the wounds.

Few studies have been published evaluating NPWT (also combined with the silver dressings) in wound management and lymphedema [8]. One case series study of early postoperative NPWT application with Charles excisional procedure demonstrated shortened blood leakage and diminished skin re-grafting demands [9]. Although the International society of lymphology.

ISL advises the use of NPWT in lymphoedema patients in conjunction with CDT there are no studies on its efficacy in reducing the edema. Using VAC facilitates healing of traumatic wounds in patients with chronic lymphoedema and also improves the quality of life by eliminating pain and preventing reinfection [10,11]. However, none of the studies have used RONPT. In our patient, it has helped in the healing of the wounds and also helped in preventing further infections (Possibly anaerobic infections).

Conclusion

Even though our study has shown a positive result, randomized control trials are needed to know the efficacy of the treatment and also further studies are needed to know its role in reducing the edema in such patients.

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