

## Role of External Tissue Expansion for Wound Closure (ETEWC) in Fournier's Gangrene: A Case Report

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### Abstract

Necrotising Fasciitis of the perineum is a challenging problem to tackle with issues like rampant infections, repeated debridements and comorbidities. It is characterised by a long clinical course with majority of that time needed in wound bed preparation. External Tissue expansion for wound closure (ETEWC) is an indigenous and simple modality that involves stretching of the wound margins and helps in early wound closure while not interfering with the wound bed preparation.

It involved application of hooks on the wound margin and using rubber bands to pull the opposite ends together with a dressing in situ. It acts like a dressing holder and prevents skin margin retraction while not interfering with the time taken for the wound infection to settle. ETEWC for aiding wound closure in Fournier's gangrene wound has not been reported in available literature. We wanted to report our experience with the same.

**Keyword:** ETEWC; Fournier's Gangrene; Skin Stretching devices; Wound closure.

### Introduction

Necrotising fasciitis of the perineum also known as Fournier's gangrene, is a challenging disease

to treat. It is a life threatening disease with a documented mortality ranging from 20 to 80%.<sup>1</sup>

Throughout history it has been known by various terms like idiopathic gangrene of the scrotum, periurethral phlegmon, streptococcal scrotal gangrene, phagedema and synergistic necrotising cellulitis. Wound management of Fournier's gangrene includes a long and tedious clinical course with frequent debridements, dressings, IV antibiotics and similar modalities.<sup>2</sup>

Various modalities of wound cover are used in Fournier's gangrene including split skin grafts, groin flaps and musculocutaneous flaps.<sup>2</sup>

Another novel modality for closure of such wounds is the use of external tissue expansion devices or skin stretch devices. These techniques exploit the visco elastic properties of the skin. The mechanism of action of this phenomenon includes both mechanical and biological creep. Mechanical creep is the predominant among the two. Mechanical creep is the phenomenon of parallel alignment of collagen dermal fibres, together with the progressive displacement from the dermal network of mucopolysaccharide ground substance during stretch. Biological Creep includes incorporation of new cells to increase the surface area.<sup>3</sup>

Although many skin stretch techniques are available today but they are not used commonly due to high cost and difficult availability.

We have devised a simple, indigenous, cost effective technique using skin hooks and rubber bands. This technique leads to simple, tension free

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primary closure over time and progressive decrease in wound size.

Moreover, it also acts like a dressing holder in difficult areas like the scrotum where dressing getting slipped is a common problem. The aim of this study was to study the role of ETEWC in achieving wound closure in a case of Fournier gangrene status post debridement, whose general condition did not permit other interventions.

### Case Report

A 65-year-old gentleman, resident of Tamil Nadu, India, a known diabetic with uncontrolled sugar levels, presented to our hospital with complaints of gradually progressive scrotal swelling for 3 days associated with redness, severe pain, and high-grade fever with chills. He had been operated for hydrocele in a local government hospital 7 days ago and developed wound infection following surgery.

On examination, he was anxious, irritable, dehydrated, with a temperature of 101.6 F and tachycardia. There was significant scrotal wall edema, erythema and blackish necrotic patches over the right hemi-scrotum (Fig. 1). Right testis was enlarged and covered with slough. The perineal region was edematous. The clinical findings were supplemented with an urgent ultrasonography of the perineal region and a diagnosis of Fournier's gangrene was made and was planned for urgent debridement. Fournier's gangrene severity index (FGSI) score was 9 at presentation.<sup>4</sup>

He was admitted on emergency basis and resuscitated. Insulin dose was titrated to control the blood sugars. Intravenous (IV) antibiotics were started and immediate debridement was done.

Regular dressings were changed on need basis (whenever wound soakage was noted). After 2 dressing changes, wound started improving. One sitting of negative pressure wound therapy (NPWT) dressing was applied, it led to drastic decrease in local edema. Healthy granulation tissue was noted at the base. Wound size was documented using planimetry software. Patient was not compliant for subsequent sitting of NPWT and the decision to switch over to ETEWC was done. Easily available blouse hooks and rubber bands were procured and sterilised using Ethylene oxide.

The hooks were sutured to the wound margin under local anesthesia to healthy skin using non absorbable sutures. They were fixed circumferentially around the wound. Rubber bands

were applied to the opposite hooks with a gentle traction. The tension was maintained just enough to avoid cut through of the sutures holding the hooks. The required dressing was placed on the wound and held in place by the hooks.

Three sittings of ETEWC were applied subsequently over intervals of 3–5 days depending on the wound soakage and new rubber bands were applied over the previous ones to maintain the tension and continuous tension of the edges.

After 2 weeks, the wound size decreased drastically in comparison to 6\*3 cm initially to 4\*2 cm and prompt primary closure of the wound was done. It may be noted that ETEWC was used in parallel to other modalities of wound bed preparation and wound infection control.



Fig. 1: Wound at presentation



Fig. 2: Wound after primary Debridement



Fig. 3: Wound after 1 sitting of NPWT



Fig. 4: ETEWC applied to the wound



Fig. 5: Wound after 1 sitting of ETEWC

## Discussion

Biomechanical properties of the skin include creep, stress relaxation, extensibility and visco-elasticity. Visco-elasticity include viscosity and elasticity where elasticity describe characteristics that deformation due to stress can be temporary where as viscosity describe the permanent deformation that is maintained when stress is relieved.<sup>5</sup>

Stress relaxation indicates that if the skin is stretch over a constant distance, the amount of tension required to keep the skin stretch will decrease with time.<sup>5</sup>

All skin stretching system relies on the above biomechanics properties of the skin.<sup>5</sup>

First attempt to make a similar device was made by Bashir in 1987, Hirshowitz in 1992 devised a skin stretching equipment which became hugely popular. Since then various devices like EASApprox<sup>TM</sup>, Topclosure<sup>TM</sup>, SureClosure<sup>TM</sup>, WiseBands, etc have been in practice but their use is limited due to high cost and non availability in our country.<sup>5,6,7,8</sup>

Our Technique of using blouse hooks and rubber bands is simple and based on the same principles. The tension on the rubber bands is variable and operator dependent. The average cost for applying the ETEWC was USD 7 to 10 \$ in each sitting in our setting.

Fournier's gangrene is named after Jean Alfred Fournier, a parisian dermatologist, who described a fulminant gangrene of the scrotum occurring in young men and progressing rapidly in 1883.<sup>9</sup> The understanding of the disease has since evolved to the present day. Wound closure rate of fournier's gangrene is documented to be 82.8% at 6 months post disease.<sup>10</sup>

Classically, FG is characterised by associated co-morbid conditions and poor wound healing due to rampant suppurative end arteritis and gangrene associated with systemic causes like uncontrolled diabetes, old age and poor self care, moreover scrotal wounds are difficult to manage because of repeated contamination, retraction of scrotal skin which increases the size of defect and difficulty in maintenance and position of dressing. In such a scenario, newer innovative modalities which accelerate wound healing and closure lead to an enormous reduction in the morbidity and cost of health.

ETEWC is a novel technique which has been proven over time and in its indigenous form, is inexpensive and lead to astounding results.



Although this case report suggests quick healing and positive aspects of the modality, a planned case control study to validate the same will be planned in the future.

### Conclusion

ETEWC is a cost effective method with excellent results for achieving primary wound closure in a case of Fournier's gangrene. It is especially relevant in the perineum because generous amount of lax skin is present which gives quick and excellent results. A larger case control study may be planned to objectively validate the above findings.

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