

Treatment of Fournier's Gangrene With Vacuum-assisted Closure Therapy as Enhanced Recovery Treatment Modality

ATHANASIOS SYLLAIOS¹, SPYRIDON DAVAKIS¹, LYSANDROS KARYDAKIS¹,
MICHAEL VAILAS¹, NIKOLAOS GARMPIIS², EFSTRATIA MPAILI¹,
ELEANDROS KYROS¹, EVANGELOS FELEKOURAS¹ and ALEXANDROS PAPALAMPROS¹

¹First Department of Surgery, Laiko General Hospital,
National and Kapodistrian University of Athens, Athens, Greece;
²Second Propedeutic Department of Surgery, Laiko General Hospital,
National and Kapodistrian University of Athens, Athens, Greece

Abstract. *Background/Aim:* Fournier's gangrene is an uncommon, but extremely serious condition of necrotizing, soft tissue infection. There is a great debate regarding the management of larger defects and wound closure, with various techniques being described in the current literature. We aimed to present the surgical management of extensive Fournier's gangrene treated successfully with Vacuum-assisted closure (VAC) therapy, a novel approach to treatment algorithm that can lead to a paradigm shift. *Case:* A 66-year-old male patient with Fournier's gangrene was treated with extensive surgical debridement, protective colostomy and VAC therapy. *Results:* After initial extensive surgical debridement, VAC therapy significantly improved the clinical and aesthetic condition of the patient. *Conclusion:* VAC therapy in Fournier's gangrene patients may be a safe and effective technique with favorable clinical outcomes, by improving and enhancing wound healing and recovery.

Fournier's gangrene is a necrotizing, soft tissue infection, characterized by obliterative endarteritis and thrombosis of the subcutaneous arteries resulting in gangrene of the subcutaneous tissue and overlying skin. It spreads along the deep external fascial planes of the perineum, scrotum (or vagina), penis, thighs and lower abdomen (1).

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Correspondence to: Nikolaos Garmpis, MD, General Surgery Registrar, Second Propedeutic Department of Surgery, Laiko General Hospital, National and Kapodistrian University of Athens, Athens, Greece. Tel: +30 6976291403, e-mail: nikosg22@hotmail.com

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Fournier's gangrene is usually a polymicrobial necrotizing infection of the perineal subcutaneous fascia and male genitalia that originates from the skin, urethra, or rectum. *E. coli*, *Bacteroides*, *Staphylococcus*, *Proteus*, *Streptococcus*, *Pseudomonas*, and *Enterococcus* are the most commonly found microorganisms. Radical surgical debridement is the gold-standard treatment option (1, 2). The rapid progression of the disease to underlying and adjacent tissues usually demands extensive surgical debridement, which leaves large deficits. There is a great discussion on the management of larger defects and wound closure with various techniques being described in the current literature (2).

Herein, we describe a case of a previously healthy 66-year-old male patient with Fournier's gangrene and the successful management with extensive surgical debridement, protective colostomy and vacuum-assisted closure (VAC) therapy. Only a few case reports and small case series have described the safety and efficacy of this wound-closure technique in the current medical literature.

Case Report

A 66-year-old male patient was referred to our emergency department due to scrotal and perineal pain. He was treated for excessive perianal abscess with surgical debridement two days before elsewhere, but his condition was worsening. His prior medical history was unremarkable other than the total thyroidectomy and bipolar disorder under treatment.

Clinical examination revealed edema, redness of the scrotal and perineal area and necrotic areas of skin and fever, compatible with necrotizing fasciitis. Laboratory examinations revealed leukocytosis (15.658 mg/dl) with right shift (Neut=91%). He underwent Contrast-enhanced computed tomography (CT) scan of the abdomen and perineum, which showed soft tissue gas (subcutaneous emphysema) in the



Figure 1. Wide radical surgical debridement and penrose placement.

scrotal area. Clinical examination and imaging tests set the diagnosis of necrotizing fasciitis (Fournier's gangrene).

The patient was then treated with radical surgical debridement of the affected area. Intraoperatively, abscess with horseshoe fistula surrounding the anus and scrotal and perineal area, with extensive soft tissue contamination were found. Penrose drains were placed in the ischioanal fossa and in the perianal fistula duct (Figure 1). Furthermore, a loop colostomy was created, to reduce bacterial colonization of the affected area.

Microbiological examinations of necrotizing tissues and abscess fluid revealed bacterial colonization of the trauma with *Streptococcus anginosus*, *Staphylococcus aureus* and *Citrobacter koserii*. The patient was then administered wide spectrum antibiotics (Vancomycin 1 g S:1x2 and Ciprofloxacin 400 mg S:1x2).

At the third post-operative day, and after daily surgical debridement, VAC device was placed to further improve healing and enhance wound recovery (Figure 2). Wound changes were performed every three days with VAC therapy thereafter. At the thirteenth post-operative day, wound cultures revealed very-low bacterial colonization; this



Figure 2. Vacuum-assisted closure therapy on the affected area.

allowed primary closure of the scrotal and the perineal trauma (Figure 3). The patient was discharged on the 25th post-operative day. Restoration of the alimentary tract was performed 3 months later. The perineal trauma was significantly improved (Figure 4). The patient is in a good overall condition, with adequate sphincter functionality and remains symptom-free 6 months postoperatively.

Discussion

Fournier's gangrene is an uncommon, but, extremely serious condition with an incidence of 1 patient in 7,500 people and a higher prevalence in male patients in the 5th decade of life. Despite advances in the medical field, mortality rate of Fournier's gangrene still remains as high as 67% of all cases. Initial portals of entry may be an extension from urinary tract or perianal infection, or local trauma. Diabetes, chronic alcohol use, steroid intake, malignancies, anticancer agents, HIV infection, and neurologic deficits that impair physical activities are risk factors for Fournier's gangrene (3, 4). Fournier's Gangrene Severity Index (FGSI) score is a reliable method to forecast the prognosis of the patients (5).

Management of Fournier's gangrene is extremely challenging. Hemodynamic stabilization, parenteral broad-spectrum antibiotics and urgent surgical debridement are the main principles of therapy (6, 7). All necrotic tissue should



Figure 3. Primary closure of the perineal trauma.



Figure 4. Post-operative clinical outcome after 3 months.

be carefully excised. Testes and spermatic cords are generally not affected by the disease. Clinical outcomes do not seem to be affected by performing a single aggressive surgical debridement with a single-stage reconstruction or with repeated surgical debridements with staged reconstruction. The rapid progression of the disease usually demands extensive surgical debridement, which generates large deficits. The well-known conventional method for wound closure of wet-to-dry is simple, cost-effective and keeps the wound site clean. The main drawback of this method is the frequent dressing changes (8).

A newly-developed method which has only been used in some case reports and small case series is the negative pressure wound therapy. VAC converts an open wound into a temporarily closed and controlled environment. These devices stimulate angiogenesis and may lead to nourishment improvement and tissue formation creating a favorable environment for wound healing. Vacuum-assisted closure therapy (VAC) facilitates the wound healing processes. It seems that VAC therapy leads to fewer dressing changes, less pain, fewer skipped meals, greater mobility, reduced hands-on treatment time for the clinician and probably a shorter hospital stay compared to the conventional method used, and without compromising safety and mortality in Fournier's gangrene patients (8).

Reconstructive surgeries with skin grafts and hyperbaric oxygen therapy have also been proven effective in large deficits. Rectal diversion with protective colostomy is controversial in Fournier's gangrene management. It decreases the number of germs in the perineal region, improves wound healing, provides local control of the infection and enables early-oral feeding (1). The use of Flexi-seal fecal management system (FMS) is an alternative to diverting colostomy in the management of fecal stream in selected Fournier's gangrene patients. It is cost effective and improves patient comfort with a short-term fecal diversion, avoiding the complications associated with colostomy (1, 8).

In our patient, we decided to perform an extensive surgical debridement; VAC therapy, protective loop colostomy and healthy tissue approximation with interrupted sutures for eliminating the large deficit. Overall, our technique was proven safe and effective, providing good clinical outcomes.

In conclusion, Fournier's gangrene management still remains extremely challenging. VAC therapy in Fournier's gangrene patients seems a safe and effective technique, providing at least good if not improved clinical outcomes for these patients by improving and enhancing wound healing and recovery. Larger studies are needed to validate our results.

Conflicts of Interest

The Authors have no conflicts of interest to declare regarding this study.

Author's Contributions

Athanasios Syllaios: drafting of manuscript and interpretation of data; Spyridon Davakis: analysis and interpretation of data, drafting of manuscript, critical revision of manuscript; Lysandros Karydakis: drafting of manuscript and analysis and interpretation of data; Michail Vailas: acquisition of data, drafting of manuscript; Nikolaos Garpis: acquisition of data and drafting of manuscript; Efstratia Mpaili: drafting of manuscript and analysis and interpretation of data; Eleandros Kyros: acquisition of data, drafting of manuscript; Alexandros Papalampros: study conception and design, critical revision of manuscript; Evangelos Felekouras: study conception and design, acquisition of data and drafting of manuscript, critical revision of manuscript.

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