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Yimei Luo
the First Affiliated Hospital of Army Medical University
Jia Luo
the First Affiliated Hospital of Army Medical University
Siyuan Ma
the First Affiliated Hospital of Army Medical University
Wei Zhu
zhuwei666@tmmu.edu.cn

the First Affiliated Hospital of Army Medical University

Case Report

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Damage control surgery and stoma-free negative pressure wound therapy for Fournier's gangrene with retroperitoneal extension: a case report

Yimei Luo[1], Jia Luo[1], Siyuan Ma[1], Wei Zhu[1],*

[1] Institute of Burn Research, the First Affiliated Hospital of Army Medical University, State Key Laboratory of Trauma and Chemical Poisoning, Chongqing 400038, China

Yimei Luo and Jia Luo contributed equally to this work and share first authorship.

*Correspondence: Wei Zhu, MSc, Institute of Burn Research, the First Affiliated Hospital of Army Medical University, No. 30 Gaotanyan Main Street, Shapingba District, Chongqing 400038, China. Email: zhuwei666@tmmu.edu.cn. ORCID: 0009-0008-4210-7355

Abstract

Background: Fournier's gangrene (FG) is a fulminant necrotizing fasciitis of the perineal, genital, and perianal regions, and reported mortality ranges from 10% to 40%. Outcomes deteriorate further when septic shock and retroperitoneal extension coexist. Guidelines recommend prompt, thorough debridement, but in this subgroup radical excision may breach the peritoneal cavity or cause massive haemorrhage, and the role of damage control surgery (DCS) is poorly defined. We describe a patient with FG extending to the retroperitoneum managed with staged DCS, a stoma-free negative pressure wound therapy (NPWT) assembly, and early function-oriented rehabilitation.

Case presentation: A 36-year-old male labourer with newly diagnosed type 2 diabetes mellitus was transferred after 18 days of treatment elsewhere for septic shock, *Klebsiella pneumoniae* bacteraemia, and necrotizing fasciitis that had persisted despite three debridements. He had full-thickness necrosis of the lower abdominal wall, both groins, perineum, and scrotum, with retroperitoneal and pelvic extension and sinus tracts reaching

the peritoneal plane, without bowel involvement or peritoneal perforation. Because radical excision was judged too hazardous, necrotic fascia was removed incrementally at repeated operations while tissue in the zone of stasis was preserved; a modified NPWT assembly (anal tube, perianal adhesive sealant, continuous irrigation) combined with mechanical bowel preparation and a residue-free diet avoided diverting colostomy. Culture-guided antimicrobials, glycaemic control, nutritional support, endoscopic clipping of two bleeding points on day 7, and rehabilitation from admission completed the programme. Nine operations were required; flap transfer and skin grafting achieved closure on day 37, and he was discharged on day 114. Lower-limb muscle strength recovered from Medical Research Council grade 1 to grade 4, and at four months he had returned to independent living and manual work without recurrence.

Conclusions: In selected patients with FG and retroperitoneal extension who have no bowel perforation, clostridial progression, or uncontrolled haemorrhage, staged DCS with stoma-free NPWT and early rehabilitation proved feasible and preserved function. A single case cannot establish efficacy; the report offers a management template and a hypothesis for prospective study.

Keywords: Fournier's gangrene; damage control surgery; necrotizing fasciitis; negative pressure wound therapy; stoma-free management; rehabilitation; case report

Background

Fournier's gangrene (FG) is a rapidly progressive, life-threatening necrotizing fasciitis of the perineal, genital, and perianal regions, and mortality remains between 10% and 40% despite modern critical care [1]. Mortality rises further when the disease is complicated by septic shock, extensive tissue necrosis, and retroperitoneal extension, an uncommon presentation that has been described mainly in individual reports and carries a poor prognosis [2]. Because

early symptoms are insidious, the diagnosis is frequently delayed, and multi-organ dysfunction may develop before the condition is recognised [1]. Diabetes mellitus is the most prevalent comorbidity, reported in 32% to 66% of patients and over-represented among non-survivors [3]. International guidelines recommend prompt, thorough surgical debridement combined with broad-spectrum antimicrobial therapy [4], and a 2025 consensus statement adds two qualifications that bear directly on the present case: the initial operation should be swift and should avoid excessive debridement that may complicate later wound repair, and debridement should be repeated until all necrotic tissue has been removed [5]. In critically ill patients with retroperitoneal involvement, however, even this approach carries a substantial risk of peritoneal perforation and massive haemorrhage.

Damage control surgery (DCS) removes only clearly necrotic tissue at each session and preserves the zone of stasis, so that physiological recovery can occur between operations. Indirect support comes from a multicentre cohort of 160 patients with necrotizing soft tissue infection, in which each additional 20 min of initial debridement was associated with a longer intensive care stay and a longer hospital stay, although not with 30-day mortality [6]. DCS itself has been described only in individual patients with necrotizing soft tissue infection, including one resuscitated from cardiac arrest [7], and it has rarely been reported in FG with retroperitoneal extension. We report a patient with this presentation who was managed by staged DCS, a modified stoma-free NPWT assembly, and comprehensive multidisciplinary care, and in whom complete wound healing and functional recovery were achieved.

Case presentation

Initial presentation and assessment

A 36-year-old male labourer with no previously diagnosed chronic disease presented with a 30-day history of progressive perianal symptoms, including post-defecation haematochezia of

unknown cause, which he initially attributed to haemorrhoids. Eighteen days before transfer he had been admitted elsewhere with septic shock, *Klebsiella pneumoniae* bacteraemia, and necrotizing fasciitis. Despite three debridements, mechanical ventilation, vasopressor support, and broad-spectrum antibiotics, his condition deteriorated, with progressive wound necrosis, persistent sepsis, and faecal incontinence, and he was transferred urgently to our burn unit.

On admission (day 0) he was conscious but markedly fatigued, and haemodynamic stability was maintained with low-dose vasopressor support that was subsequently weaned. Physical examination showed full-thickness necrosis of the lower abdomen, both groins, perineum, and scrotum, with exposed testes and copious malodorous purulent discharge. Incision and drainage sites over the left trunk and inguinal region showed necrotic fascia adherent to the wound surface, and the perianal region had been debrided and sutured at the referring hospital (Fig. 1). Muscle strength in both lower limbs was Medical Research Council (MRC) grade 1, with profound atrophy, and no peritoneal irritation was elicited. The admission diagnosis was FG.

His medical history was otherwise unremarkable: he was taking no regular medication and gave no history of immunosuppressive therapy, glucocorticoid use, chemotherapy, or radiotherapy. Family history was unremarkable, with no family history of diabetes mellitus, primary immunodeficiency, or necrotizing soft tissue infection. Lifestyle history was also unremarkable: he neither smoked tobacco nor drank alcohol, used no recreational drugs, and reported no recent travel, animal contact, or unusual dietary exposure. The only identifiable predisposing condition was type 2 diabetes mellitus, which was diagnosed for the first time on admission in the form of diabetic ketoacidosis and had therefore never been treated; undiagnosed chronic hyperglycaemia is the most plausible explanation for the severity and rapid spread of the infection.

Laboratory investigations showed severe systemic inflammation (white blood cell count 18.6

× 10^9/L, neutrophils 96.5%, interleukin-6 85.15 ng/L, C-reactive protein 290.4 mg/L, procalcitonin 0.51 ng/mL), newly diagnosed diabetic ketoacidosis (random blood glucose 22.2 mmol/L), hypoalbuminaemia (24.3 g/L), thrombocytopenia (73 × 10^9/L), and acute renal impairment (serum creatinine 121.5 μmol/L). Serial wound and blood cultures grew *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, *Staphylococcus epidermidis*, and other organisms. Contrast-enhanced pelvic computed tomography and abdominal magnetic resonance imaging confirmed subcutaneous gas and fluid collections extending from the perineum to the pelvic mesentery, sinus tracts in the perineal, perianal, and right inguinal regions, and retroperitoneal and pelvic extension, without bowel wall involvement or peritoneal perforation.



Fig. 1 Wound appearance on admission to our unit. **A** Incision and drainage sites over the left trunk and inguinal region. **B** Perineal wound with exposed testes and purulent discharge. **C** Perianal wound.

Differential diagnosis

Five infective diagnoses and a group of non-infective mimics were considered, and each was tested against a single decisive finding.

- **Simple perianal abscess** — excluded because computed tomography showed gas within the fascial planes rather than a single confined fluid collection, a pattern an abscess does not produce.
- **Clostridial myonecrosis** — the most important alternative, given the greenish wound

discolouration, the sweetish musty odour, and the soft-tissue gas, but excluded because the muscle was intact at every operation and no *Clostridium* species grew on repeated cultures.

- **Type II monomicrobial necrotizing fasciitis (group A streptococcus)** — excluded because no culture grew group A streptococcus, whereas a polymicrobial flora in a patient with diabetes is characteristic of type I disease.
- **Primary retroperitoneal or psoas abscess with cutaneous fistulisation** — excluded because gas and fluid tracked along the fascial planes from the perineum to the pelvic mesentery rather than arising from one retroperitoneal collection.
- **Necrotizing fasciitis secondary to a perforated viscus** — excluded because the sinus tracts reached but did not breach the peritoneal plane, with no bowel wall involvement or free intraperitoneal gas.
- **Non-infective mimics (calciphylaxis, warfarin-induced skin necrosis, pyoderma gangrenosum, and hidradenitis suppurativa)** — excluded because the presentation was acute and febrile with purulent discharge, renal function was only mildly impaired, there was no warfarin exposure, and no violaceous undermined border or comedo-like lesions were seen.

The final diagnosis was type I polymicrobial necrotizing fasciitis of the perineum, genitalia, and lower abdominal wall (FG) with retroperitoneal and pelvic extension, complicated by septic shock, acute kidney injury, and diabetic ketoacidosis. The diagnostic difficulty lay less in recognising necrotizing infection, which was evident on transfer, than in defining its deep extent, which determined whether radical excision was feasible and required both magnetic resonance imaging and repeated operative exploration.

Operative strategy: staged damage control surgery

Initial management comprised empirical antimicrobials, parenteral nutrition, strict glycaemic control, and organ support. After stabilisation, extensive incisional debridement of the perineum and abdomen was performed. At operation, extensive necrotic fascia with adherent purulent secretions and multiple sinus tracts tracking towards the abdominal cavity were encountered, while the underlying muscle remained intact; intraoperative general surgical consultation confirmed that these tracts had reached the peritoneal plane. Radical debridement was judged prohibitively risky because it would prolong operative and anaesthetic time, increase blood loss, and risk peritoneal perforation or severe peritonitis. A staged DCS strategy with adequate drainage and intensified systemic support was therefore adopted. Necrotic fascia was removed incrementally with tissue scissors, curettes, and disposable suction catheters, which reduced the bacterial burden without producing diffuse haemorrhage or iatrogenic injury to normal and marginally viable tissue.

Stoma-free modified negative pressure wound therapy

Modified NPWT, comprising a perianal sealant and continuous wound irrigation, was applied to evacuate necrotic material and secretions, to control deep-seated infection, and to promote conversion of marginal tissue to healthy tissue (Fig. 2). To avoid a diverting colostomy while limiting faecal contamination, mechanical bowel preparation was performed before operation, an anal tube was inserted and a perianal adhesive sealant applied before the film was placed, and postoperative parenteral nutrition with a residue-free diet reduced the frequency and volume of bowel movements.



Fig. 2 Modified negative pressure wound therapy, comprising an anal tube, a perianal sealant, and continuous wound irrigation.

Complication and continuation of the staged plan

On post-admission day 7 (postoperative day 3), massive haemorrhage from the perianal sinus tract reduced haemoglobin to 67 g/L. Emergency colonoscopy identified two actively bleeding points 6 cm from the anal verge within a large area of mucosal erosion; endoscopic clipping achieved haemostasis and spared the patient emergency surgical exploration. After multidisciplinary reassessment had reaffirmed the staged strategy, four further DCS procedures with modified NPWT were performed at intervals of 6 to 8 days under general anaesthesia, each limited to clearly necrotic tissue while marginally viable tissue in the zone of stasis was preserved. After five courses of DCS with modified NPWT, necrotic tissue had gradually cleared, healthy granulation tissue had formed, and the sinus tracts connecting the bilateral iliac regions to the abdominal and pelvic cavities had essentially closed. On post-admission day 37, definitive reconstruction was achieved by flap transfer and skin grafting (Fig. 3).

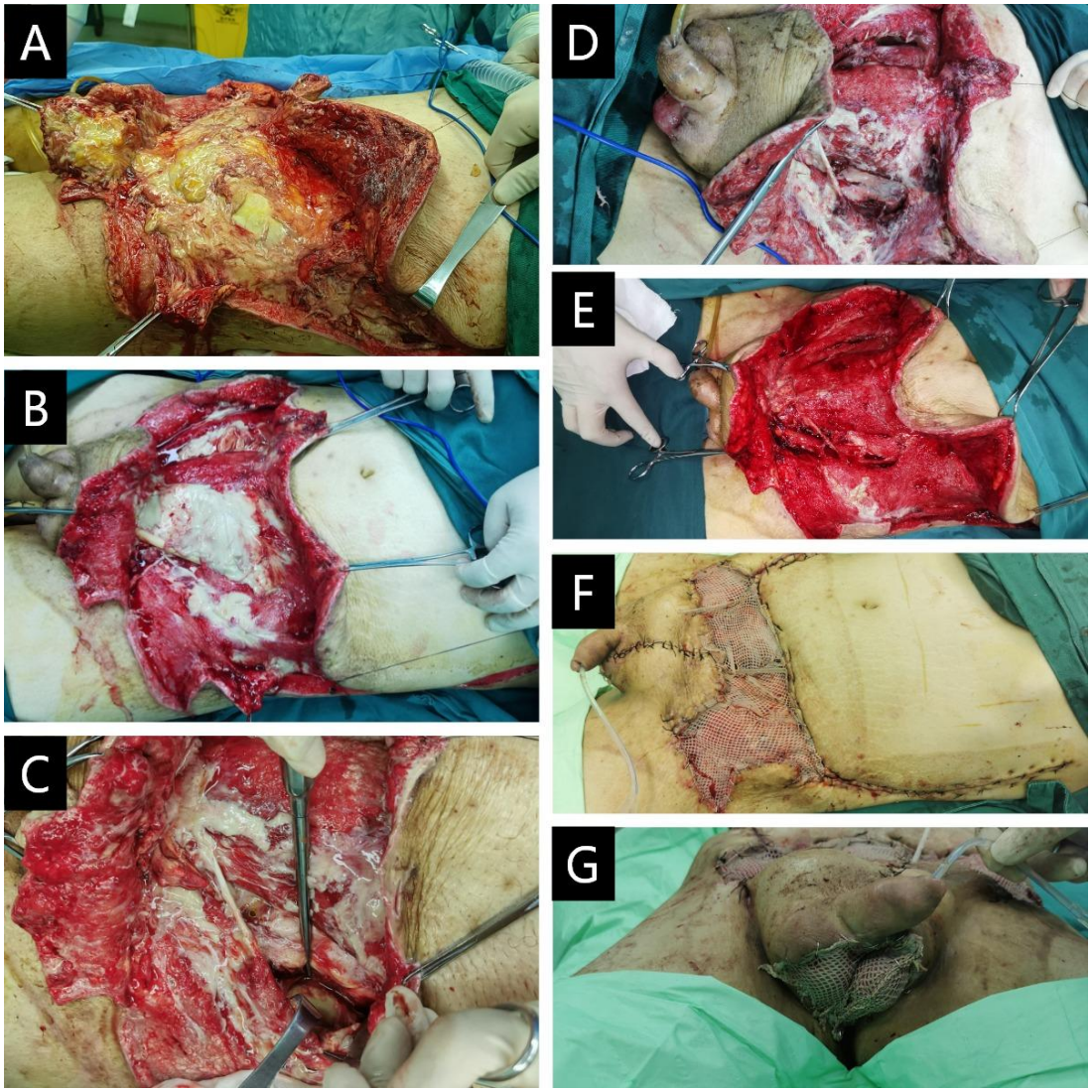


Fig. 3 Intraoperative findings during staged damage control surgery. **A** Day 4: initial debridement of grossly necrotic tissue. **B** Day 10: further removal of necrotic fascia with preservation of marginally viable tissue. **C** Day 16: progressive granulation tissue formation. **D** Day 24: resolution of deep tissue infection and regression of sinus tracts. **E** Day 30: near-complete clearance of necrotic material. **F, G** Day 37: skin grafting and flap reconstruction for wound closure.

Adjunctive management and rehabilitation

Because repeated cultures grew a polymicrobial Gram-negative and Gram-positive flora and no clostridial species, antimicrobial treatment was directed throughout against the organisms

actually isolated. Empirical ceftazidime plus amikacin (days 1–4) was followed by targeted meropenem and linezolid directed against multidrug-resistant Gram-negative and Gram-positive organisms (days 5–25), and treatment was then de-escalated to cefoperazone-sulbactam plus amikacin. Glycaemic control progressed from continuous intravenous insulin infusion to subcutaneous basal-bolus insulin and ultimately to oral hypoglycaemic agents. Nutritional support advanced sequentially from total parenteral nutrition to low-residue enteral nutrition and then to full enteral feeding.

Rehabilitation was delivered as an early, full-course, function-oriented programme. From the day of admission, while the patient remained critically ill, bedside training began with bed mobility exercises, passive range of motion for both lower limbs, and neuromuscular electrical stimulation of the atrophied lower-limb muscles to counteract disuse atrophy. As the wounds stabilised, training progressed stepwise from sitting balance and standing-frame work to walker-assisted ambulation and finally to active resistance strengthening and gait training, in parallel with recovery of muscle strength from MRC grade 1 to grade 4. Psychological support ran in parallel and was regarded as equally important, because a disease that threatened death or paralysis imposed a burden that affected appetite, sleep, and engagement with treatment, and these factors may further compromise immunity; weekly counselling, reinforced by the care team and the family, sustained confidence and adherence throughout the protracted course. Scar management comprised silicone gel, paraffin wax therapy, and carbon dioxide laser treatment.

Outcome and follow-up

The patient underwent nine operations in total (three at the referring hospital and six at our institution) before complete wound healing was achieved (Fig. 4). He was discharged on post-admission day 114, alert, with stable vital signs and controlled infection; fasting blood

glucose ranged from 6.8 to 9.3 mmol/L, electrolytes were normal, lower-limb strength had recovered to MRC grade 4 with independent ambulation, and wound exudate and blood cultures were negative. During four months of follow-up after discharge, there was no recurrence of necrotizing fasciitis. Apart from hypertrophic scarring in the abdominal skin graft areas, the flap-reconstructed regions showed satisfactory texture; urination and sexual function were normal, and there was no ventral hernia or scar ulceration. Muscle strength returned nearly to normal, allowing independent daily activities, stair climbing, squat-to-stand manoeuvres, and running, with successful social reintegration (Additional files 1 and 2). The sequence of interventions and the corresponding clinical course are summarised in Fig. 5.



Fig. 4 Healed wounds after reconstruction.

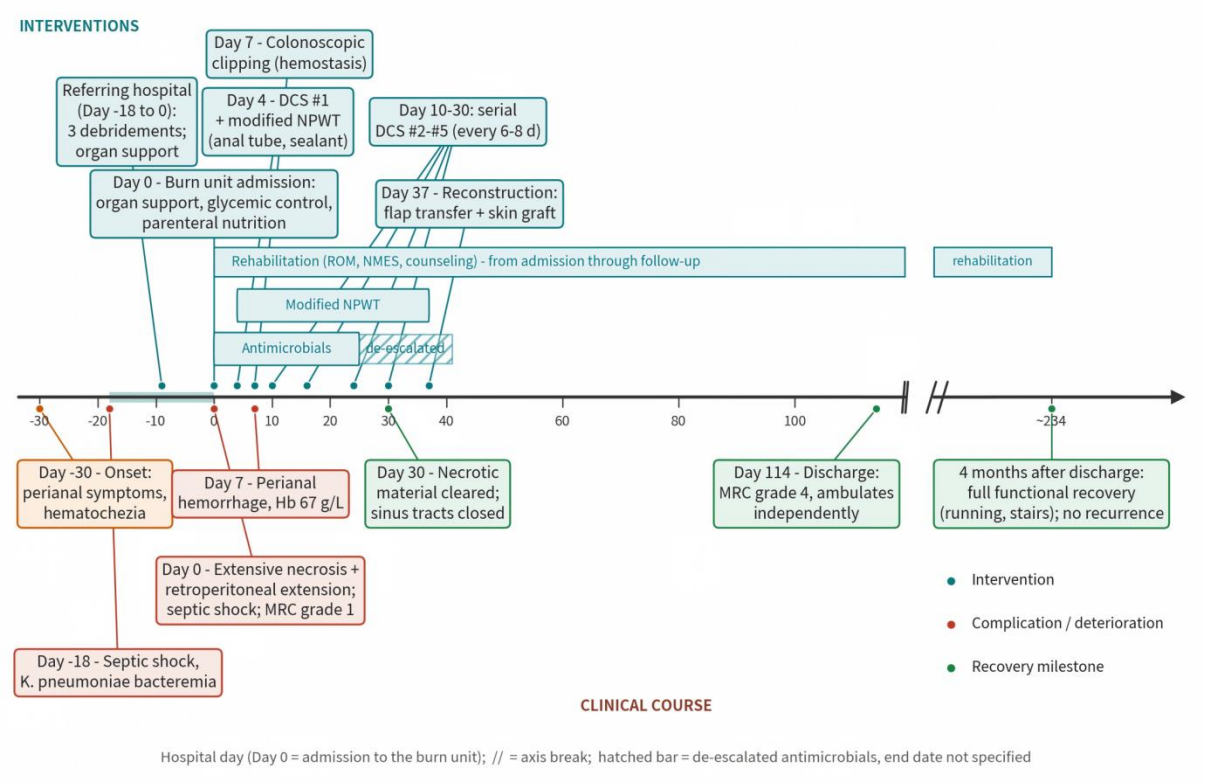


Fig. 5 Fishbone-style timeline of interventions and clinical course. Interventions (upper lane) and clinical evolution (lower lane) are plotted against hospital day, with day 0 denoting admission to our unit; colour coding distinguishes interventions (teal), complications or deterioration (red), and recovery milestones (green). DCS, damage control surgery; NPWT, negative pressure wound therapy; ROM, range of motion; NMES, neuromuscular electrical stimulation; MRC, Medical Research Council; ADL, activities of daily living.

Patient perspective

At the four-month review the patient was asked to describe his own experience of the treatment, and his account is summarised here. The hardest period, in his account, was not the surgery but the weeks in which he could not stand, could not control his bowels, and depended on his family for washing and feeding; the daily bedside exercises were the only visible sign of progress and the main reason he did not give up. His greatest fear was that he would never walk again, and the recovery of independent walking, stair climbing, and

squatting mattered to him more than the appearance of the scars. He valued the avoidance of a colostomy because it spared him a second operation and a stoma, and he was relieved that urination and sexual function returned to normal. He asked that the report record that recovery was far slower than he had expected and required persistence with exercises whose benefit was not apparent for weeks, and he agreed to the publication of his case in the hope that it would help other patients accept a prolonged staged course.

Discussion

Staged damage control surgery in retroperitoneal extension

This case demonstrates the application of staged DCS in FG with retroperitoneal extension, a rare and frequently fatal presentation in which the retroperitoneum is a difficult surgical field where aggressive debridement risks massive haemorrhage and peritoneal perforation. Conventional teaching, codified in the 2014 Infectious Diseases Society of America guidelines, mandates prompt and complete excision of all necrotic tissue [4]. The 2025 consensus retains early surgery as the cornerstone while advising that the initial operation be swift, that excessive debridement be avoided because it complicates later wound repair, and that debridement be repeated until all necrotic tissue has been cleared [5]. In a patient already in septic shock, a single radical operation maximises surgical trauma, operative and anaesthetic time, blood loss, and physiological insult, and the cohort cited above suggests that a longer initial procedure carries its own physiological cost [6]. Staged DCS, by contrast, removes only clearly necrotic tissue at each session, deliberately preserves marginally viable tissue in the zone of stasis, and permits physiological recovery between procedures, converting one prohibitively risky operation into several tolerable ones. The strategy proved decisive for the retroperitoneal component: incremental debridement combined with modified NPWT allowed deep sinus tracts approaching the peritoneal plane to close progressively

without breaching the peritoneal cavity, which defused the haemorrhage and perforation risks inherent to this region. The final result, namely complete wound healing with satisfactory flap texture, normal urination and sexual function, and no ventral hernia, compares favourably with the extensive defects and functional sequelae described after radical excision.

Patient selection and safety

The safety of DCS depends on strict patient selection and continuous reassessment, principles well established in trauma surgery [8, 9]. Clostridial myonecrosis is the classic setting in which staged surgery is regarded as unsafe, and the early series that established immediate complete excision as the standard included a substantial proportion of clostridial and streptococcal infections [10]. Accordingly, the approach should be abandoned in favour of immediate radical excision when a clostridial component is suspected, when there is documented bowel perforation or necrosis [11], or when there is uncontrolled haemorrhage, rapidly progressive necrosis between staged sessions, or profound immunosuppression [12]. In our patient none of these features was present, and this was confirmed by serial imaging and declining inflammatory markers, which supported continuation of the staged strategy. Notably, whereas neonatal FG represents a distinct population in which limited, conservative debridement is preferred [13, 14], this case suggests that a comparable physiology-preserving strategy may also benefit selected critically ill adults with extensive deep-tissue involvement.

Stoma-free wound management

The second component of the strategy was stoma-free wound management. In perianal FG, diverting colostomy is often necessary to prevent faecal contamination [15], but it adds operative trauma, stoma-related morbidity, and psychological distress, and it commits the patient to a second operation for reversal that carries its own infectious risks [16, 17]. Our

modification, consisting of preoperative bowel preparation, intraoperative anal tube placement, a perianal adhesive sealant applied before NPWT film placement, continuous wound irrigation, and postoperative parenteral nutrition with a residue-free diet, achieved effective contamination control while preserving native gut continuity. Compared with diverting colostomy, this stoma-free assembly avoided the wound complications reported after stoma formation and reversal [16, 17], spared the patient the burden of an abdominal stoma, and did not compromise the adequacy of debridement or drainage. To our knowledge, such a stoma-free NPWT assembly combined with dietary management has rarely been described in FG with perianal involvement.

Function-oriented rehabilitation

The third component was early, full-course, function-oriented rehabilitation, which we consider a key contributor to the favourable outcome. Most published FG reports focus on wound closure and survival, yet wound repair is not merely skin coverage but the restoration of function. Our patient's lower-limb muscle strength recovered from MRC grade 1 to grade 4, ultimately enabling independent daily activities, stair climbing, squat-to-stand manoeuvres, and running, a degree of functional restoration that is rarely documented in FG survivors of this severity. A staged rehabilitation programme, initiated at the bedside from the day of admission with passive range-of-motion exercises and neuromuscular electrical stimulation and progressing through standing-frame training and walker-assisted ambulation to active resistance training, counteracted the disuse atrophy and joint contracture that otherwise accompany a protracted catabolic course. Psychological intervention was equally integral: the threat of death or paralysis imposed a heavy psychological burden that affected appetite, sleep, and treatment engagement and may have influenced immune function, and regular counselling with family involvement sustained the patient's confidence and adherence. For a

young manual labourer, this function-first philosophy, beginning rehabilitation on the day of admission rather than after wound closure, proved decisive for social reintegration rather than mere survival.

Limitations

This report has several limitations. It describes a single patient treated at a tertiary burn centre with extensive multidisciplinary expertise and advanced wound care resources, so replication in low-resource settings may be difficult. The patient's young age and the absence of comorbidities other than diabetes may have favoured recovery. Validated patient-reported outcome measures such as the SF-36 or EQ-5D and formal assessment of sexual and urinary function were not used, so the functional and experiential account rests on clinical assessment, the two additional video files, and the patient's own narrative rather than on scored instruments; follow-up was limited to four months, so long-term scar contracture, sexual function, and diabetes-related complications remain unassessed. Prospective comparative studies are warranted to test this strategy in broader populations.

Conclusions

This case describes an integrated management concept for life-threatening FG with retroperitoneal extension, comprising staged DCS, a stoma-free modified NPWT assembly combined with dietary control, and full-course function-oriented rehabilitation, and the concept proved feasible in this patient. As a single-case observation the report does not constitute clinical evidence; it offers a management template for discussion and generates hypotheses to be tested in prospective comparative studies of similarly selected patients.

List of abbreviations

DCS: damage control surgery; FG: Fournier's gangrene; MRC: Medical Research Council; NPWT: negative pressure wound therapy.

Declarations

Ethics approval and consent to participate

This case report was approved by the institutional ethics committee (approval no. (B2)2026KY023). The requirement for written informed consent to participate was waived by the committee because the study is retrospective and all care followed routine clinical practice.

Consent for publication

Written informed consent for publication of this case report and any accompanying images was obtained from the patient, and a copy of the consent form is available for review by the Editorial Board of this journal.

Availability of data and materials

No or not applicable. This manuscript does not report data generation or analysis.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

YL and JL conceived the report and drafted the manuscript. SM performed the surgical procedures. YL collected and interpreted the clinical data. WZ supervised the project and revised the manuscript. All authors read and approved the final manuscript.

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Declaration of generative AI use

During the preparation of this work, the authors used Kimi (Moonshot AI, accessed November 2026) solely for language polishing of the manuscript (grammar, spelling, and readability). The tool was not used to generate, draft, or translate any scientific content. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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Figure legends

Fig. 1 Wound appearance on admission to our unit. **A** Incision and drainage sites over the left trunk and inguinal region. **B** Perineal wound with exposed testes and purulent discharge. **C** Perianal wound.

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Additional files

Additional file 1: Video 1. Functional recovery of both lower limbs at four-month follow-up: crouch and squat. Format: MP4.

Additional file 2: Video 2. Functional recovery of both lower limbs at four-month follow-up: gait and stair climbing. Format: MP4.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryVideo1.mp4
- SupplementaryVideo2.mp4