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Reconstruction of scrotal and perineal defects in Fournier's gangrene

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KEYWORDS

Fournier's gangrene;
Scrotal and perineal defects;
Anterolateral thigh flap;
Scrotal advancement flap;
Skin graft

Summary *Background:* Fournier's gangrene is an acute and potentially lethal necrotising fasciitis that involves the scrotum and perineum. This disease can result in the loss of skin and soft tissue. To repair the scrotal and perineal defects remains a surgical challenge.

Methods: Between January 2000 and December 2008, 50 patients were admitted to our hospital with a diagnosis of Fournier's gangrene. We retrospectively reviewed 31 of the 44 surviving patients, who needed reconstructive procedures for coverage of scrotal and perineal soft-tissue defects. The choice of reconstructive procedure was based on the size, location, severity of the defects and the availability of local tissue. The patients' age, predisposing factors, defect size and location, reconstructive procedures and outcomes were reviewed.

Results: The mean age of the patients was 53.6 years (range, 20–84 years). The average size of the skin defect was 86 cm². A total of 12 patients were treated by scrotal advancement flap coverage, nine by split-thickness skin graft, five by pudendal thigh flap, two by gracilis myocutaneous flap, one by gracilis muscle flap plus split-thickness skin graft and three by pedicle anterolateral thigh flap. The overall surgical complication rate was 16%.

Conclusions: Early debridement and wound coverage in Fournier's gangrene are mandatory to allow patients to return to normal life. We set up a valuable reconstructive algorithm based on the characteristics of the defects and our 9 years of experience, which adds to the versatility of the armamentarium of the reconstructive surgeon.

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Fournier's gangrene was first described by Jean Alfred Fournier in 1883.¹ It is an acute and potentially lethal necrotising fasciitis that involves the skin and soft tissues of the scrotum, perineum and lower abdominal wall. The common sources of infection

include urogenital and colorectal diseases or trauma of the skin of the perineum or scrotum. Progressive infection of the skin and soft tissue may cause necrosis and defects over the scrotal and perineal region, or even sepsis or death. Early diagnosis,

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administration of broad-spectrum antibiotics and timely surgical debridement reduce the overall mortality rate.^{2–4} After adequate surgical debridement and infection control, the remaining skin and soft-tissue defects need reconstructive procedures for wound coverage. The aim of the reconstructive procedures after the initial debridement is to achieve good coverage of the defects and good cosmetic results. The purpose of the present study was to review and analyse the outcomes of our patients, who underwent reconstructive surgery for scrotal and perineal defects caused by Fournier's gangrene.

Patients and methods

Between January 2000 and December 2008, 50 patients were admitted to the Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, with a diagnosis of Fournier's gangrene. All patients underwent antibiotic treatment and emergency surgical debridement performed by urologists or colorectal surgeons. Six patients died from profound sepsis and multiple-organ failure. The survival rate was 88%. A total of 13 surviving patients were excluded from this study. One female patient was excluded because her wound defect involved the vulva and perineal area. Five of the 13 patients were treated by delayed primary closure, and the wounds of the other seven patients healed by secondary intention. We reviewed 31 of the 44 surviving patients, who needed some kind of reconstructive procedures for coverage of the defects caused by Fournier's gangrene. The patients' ages ranged from 20 to 84 years (mean 53.6 years). Broad-spectrum antibiotics were prescribed for each patient, and these were changed to specific antibiotics after a specific organism was isolated from the wound culture. Local wound care was performed after debridement, and repeated surgical debridement was performed if there was residual necrotic skin or soft tissue. We applied a vacuum-assisted closure (VAC) device to facilitate wound healing and discharge evacuation in selected patients, who had a large wound defect and massive wound discharge. Local wound care was performed using a wet-gauze dressing with saline-diluted iodine in 21 patients and VAC therapy was used in the other 10 patients. The wet-gauze dressing was applied and changed two to four times per day. In the VAC group, the VAC dressing was changed twice per week.

The 31 patients reviewed in the present study had either skin/soft-tissue defects or testis exposure that could not heal by secondary intention or be closed primarily. These patients were referred to our Division of Plastic and Reconstructive Surgery for reconstruction of the defects on the scrotum and/or perineum. The reconstructive procedures performed by our plastic surgeons included split-thickness skin grafts, scrotal advancement flaps, gracilis muscle/myocutaneous flaps, pudendal thigh fasciocutaneous flaps and pedicle anterolateral thigh flaps. The patients' age, initial symptoms, underlying co-morbidity, location and size of the defect, reconstructive procedures, surgical outcome and complications were reviewed and recorded.

Results

During the 9-year period included in this review, 31 patients diagnosed with Fournier's gangrene were included in the

study. The most common medical co-morbidity found in our patients was diabetes mellitus (18 patients, 58%). The most common symptoms were fever (28 patients, 90%), followed by pain and swelling over the scrotal or perineal area (27 patients, 87%), erythematous changes of the involved skin (22 patients, 71%) and purulent discharge (19 patients, 61%). The mean duration of symptoms before admission was 3.2 days (range 1–7 days). All patients underwent wide debridement of necrotic soft tissue over the scrotum and/or perineal region. A total of 27 (87%) patients required more than one debridement. Nineteen (61%) patients had polymicrobial infection, seven (23%) patients were infected with a single organism and five (16%) patients had negative bacterial cultures.

Reconstructive procedures were considered when healthy granulation tissue appeared in the wound bed. The average area of the defects for reconstruction was 86 cm². The choice of reconstructive procedure was based on the size, location, severity of the defects and the availability of local tissue. The scrotal advancement flap coverage was applied in 12 patients for defects that were smaller than half the scrotal surface area. In nine patients with a large area of skin defect, especially a defect extending from the scrotum to the perineum and/or the abdominal wall, split-thickness skin grafts were performed. A pudendal thigh fasciocutaneous flap was performed in five patients, and a pedicle anterolateral thigh flap was performed in three patients. Both types of flap were applied in patients with a scrotal defect larger than half the scrotal surface area or a combined defect that involved the scrotum, perineum and/or groin region. Gracilis flaps were performed in three patients with a dead cavity in the perineal area. In the VAC group, the average area of the defects was 149 cm². Five patients of the VAC group underwent split-thickness skin grafts for wound reconstruction, three by pedicle anterolateral thigh flaps, one by pudendal thigh fasciocutaneous flap and one by gracilis myocutaneous flap. Five patients (16%) had postoperative complications. Partial flap loss was observed in one patient, who had a scrotal advancement flap because of residual dead space in the perineal region, and this patient underwent a gracilis myocutaneous flap procedure for salvage. Two patients experienced wound-edge necrosis of the scrotal advancement flap and the residual raw surfaces were healed by secondary intention. Partial skin graft loss was noticed in one patient and the residual raw surface was treated by secondary intention. Postoperative haematoma was found in one patient after undergoing pedicle anterolateral thigh flap, and re-exploration of the flap with evacuation of the haematoma was performed. The patients' age, predisposing factors, defect location and size, reconstructive procedure and outcome are listed in [Table 1](#).

Case presentations

Case number 9

This 41-year-old man had a 66 cm² (measuring 11 × 6 cm) scrotal defect caused by Fournier's gangrene. The necrotic tissue was debrided and the wound base showed fresh granulation tissue after adequate wound care. A pudendal thigh flap was designed for reconstruction. The flap was elevated and then transposed to the wound defect by

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