Original Research Article

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The effectiveness of Dakin's solution in wound care after debridement in Fournier's gangrene

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ABSTRACT

Background: Fournier's gangrene (FG) is a specific form of necrotizing fasciitis seen in the external genital organs and perianal region. The basic management of Fournier's gangrene is based on critical surgical debridement. Dakin's solution (sodium hypochlorite) was originally developed to treat war wounds. In this study, we aimed to show potentially efficient of Dakin's solution on wound healing and reoperation rate.

Methods: Thirty-three patients who were debrided due to Fournier Gangrene during 2012-2020 were included in the study. After debridement, wound care was done twice a day by dressing with a sponge moistened with Dakin's solution. Patients' age, concomitant disease, involvement site, re-debridement requirement, complications, and discharge times were recorded.

Results: The mean age of 33 male patients who participated in the study was (51-74) 63.93 ± 15.36 . Although all patients had scrotal involvement, nine patients had perineal (27.2%), 12 patients had inguinal (36.3%), four patients had a penis and pubic spread (12.1%). The mortality rate was 6%. The average length of hospital stay was 13.1 ± 4.2 days, and the average number of debridements was 1.

Conclusions: Fournier gangrene is an important disease characterized by necrotizing infection of the genital, perineal, and perianal region and progresses with high mortality. Our mortality rate was lower than literature and we have linked our mortality rate to using Dakin's solution for wound care. Dressing with Dakin's solution is an effective and reliable method for wound care in FG patients.

Keywords: Dakin's solution, Debridement, FG, Wound

INTRODUCTION

Fournier's gangrene (FG) is a specific form of necrotizing fasciitis seen in the external genital organs and perianal region, which can lead to multiple organ failure and sepsis with thrombosis of the feeding arteries of skin and gangrene of the skin and subcutaneous tissue. Although this disease is rare, the unfavorable prognosis associated with this disease largely depends on the timing of medical care. Treatment delay is accompanied by high mortality of up to 90% due to the development of septic

shock and associated complications. In the past 25 years, mortality rates for FG have ranged from 0 to 42%.

The primary management of Fournier's gangrene is based on the principles of emergency hemodynamic stabilization and critical surgical debridement as part of a multidisciplinary approach and antibiotic therapy. Following radical debridement, a wide variety of procedures are used to manage the wound until healing is complete.³ Dakin's solution (sodium hypochlorite) was originally developed to treat war wounds. It was used to clean and disinfect wounds in the 20th century.⁴ Dakin's

solution is effective against a wide range of aerobic and anaerobic organisms and fungi, including organisms that are highly resistant to systemic antibiotics.⁵ In this study, we aimed to show potentially efficient of Dakin's solution on wound healing, reoperation rate and mortality on FG.

METHODS

Thirty-three patients who were debrided due to FG from May 2012 to February 2020 were included in the study. Only male patients were included in the survey because the gynecology clinic treated female patients. The patients with incomplete data was excluded from study. After approval of the study by the Health Sciences University Kocaeli Derince Training and Research Hospital Ethics Committee, we retrospectively analyzed our demographic and perioperative data in terms of results of mortality, re-debridement, sepsis, wound healing, and discharge times in FG patients undergoing dressing with Dakin's solution. All medical data was reviewed in detailed. For the demographic data, quantitative measurements are summarized as the mean and standard deviation (the median and the minimummaximum where necessary). All procedures underwent general anesthesia, and necrotic tissues in the penoscrotal, perineal, inguinal, suprapubic, and perianal regions were debrided. General surgery consultation was requested in case of rectal involvement or perforation. After debridement, patients were followed up in the intensive care unit, and third-generation cephalosporin and metronidazole treatment was given. After debridement, wound care of patients was done twice a day by covering with a sponge moistened with Dakin's solution. Dakin's solution was prepared as a 0.25% solution of sodium hypochlorite. The wounds of all patients were closed with a split-thickness graft taken from the thigh by plastic surgery following the formation of granulation tissue.

The provisions of the Helsinki Declaration conducted the study.

RESULTS

The mean age of 33 male patients who participated in the study was 63.93±15.36 (51-74). Twenty-eight of the patients had comorbidities (Table 1). Although all patients had scrotal involvement, nine patients had perineal (27.2%), 12 patients had inguinal (36.3%), four patients had a penis and pubic spread (12.1%). Three patients were consulted to general surgery with suspicion of rectum perforation, and one patient underwent colostomy. The orchiectomy was performed in one (3.0%) patient with testicular necrosis. None of the patients required re-debridement. One patient with lymphoma and one patient with abdominal wall involvement died due to sepsis. The average length of hospital stay was 13.1±4.2 days. No postoperative complications were seen in the patients.

Table 1: Demographic data of patients.

Variables	
Agea (year)	63.93±15.36
Length of hospital stay ^a (day)	13.1±4.2
Comorbidities ^b	
Diabetes	28 (84.8%)
Lyphoma	2 (8.4%)
RA	1 (3.0%)
PAD	1 (3.0%)
Post-prostatectomy	1 (3.0%)
Areas ^b	
Scrotal	33 (100%)
Inguinal	12 (36.3%)
Perineal	9 (27.2%)
Penile	4 (12.1%)
Mortality ^b	2 (6.0%)

^aData was expressed as mean±SD

RA: rheumatoid arthritis, PAD: peripheral artery disease

DISCUSSION

Fournier gangrene is a crucial disease characterized by necrotizing infection of the genital, perineal, and perianal region and progresses with 20% mortality in the literature.⁶ The spread of necrosis and infection may result in sepsis and death when debridement, antibiotherapy, and wound care are not performed at the appropriate time for this surgical emergency.⁷ In recent vears, we see a table far from the mortality in the literature with increasing surgical experience, improving intensive care conditions, using appropriate and broadspectrum antibiotics, and regular wound care. In a review of FG mortality, the average mortality of 6152 patients was found to be 19.8%, but in an epidemiological study demonstrated that this rate was found to be 7.5%.89 However, Sorensen et al found in his research that the mortality of the transferred patients was 12.7%.9 If diagnosis and treatment are planned without delay in the primary center, mortality rates do not appear to be as high as in the literature. Similar to these results, in our study, the mortality rate was found to be 6% and we have linked the aggressive and rapid debridement of our mortality rate, which is lower than the literature and using Dakin's solution for wound care. Additionally, in the study of Altunoluk et al, the mortality of the wound care group with Dakin's solution was found to lower than that of the conventional wound care group (12.5% versus 16.7%, Dakin's versus conventional group, respectively).¹

The length of hospital stay varies in the literature. While the average length of hospital stay in Yucel et al's 25 disease series was 21.4 days, and the median hospital stay was found to be 10 days in the study of Sorensen et al.^{2,9} In our study, the length of hospital stay is 13.1±4.2 days and is compatible with the literature. In addition, a novel study showed that patients who were used vacuum-assisted closure (VAC) for wound care had more

^bData was expressed as n (%)

extended hospital stay (26.4±14.5 and 12.6±12.7, VAC and no VAC groups, respectively, p=0.004).² In the study of Altunoluk et al, the duration of hospital stay was found to be 13 and 8.9 days, respectively, between patients undergoing conventional wound care and wound care with Dakin's solution, and the difference is statistically significant (p<0.05).¹ In addition to the condition of the wound, the general health of the patients and additional diseases are among the factors affecting the hospital stay. In patients followed-up with a multidisciplinary approach, the plastic surgery's graft status and the confirmation of infectious diseases doctor also affect discharge times.

Another situation encountered in conventional wound care is the patient's need for re-debridement. In the literature, the average number of debridement was 2.4.9 However, in our study, none of the patients needed re-debridement, and the average number of debridement was found to be 1. The effectiveness of Dakin's solution against aerobic, anaerobic microorganisms, and fungi, which are resistant to systemic antibiotics and wound care products, eliminated the need for re-debridement.

The limitation of this study is retrospective nature and lack of long term follow up of patients. Another limitation of the study is no conventional group due to frequently using Dakin's solution for treatment.

CONCLUSION

Dressing with Dakin's solution is an effective and reliable method for wound care in FG patients, reducing the length of hospital stay and re-debridement.

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Ethical approval: This study was approved by Ethics Committee of the Health Sciences University Kocaeli

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