Do Stoma Formation and Use of Vacuum Assisted Closure System Affect Mortality in Perineal Fournier's Gangrene?

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ABSTRACT

Objective: The aim of this study was to identify the effects of creation of stoma and the use of vacuum-assisted closure systems on postoperative mortality and hospital stay in patients with Fournier's gangrene involving anorectal region.

Study Design: A retrospective study.

Place and Duration of Study: Department of General Surgery, University of Health Sciences Tepecik Training and Research Hospital, Izmir, Turkey, from January 2010 to September 2021.

Methodology: A total of 66 patients with Fournier's gangrene with anorectal involvement were selected from hospital records and divided into two groups as alive and exitus. Differences between these two groups and the factors affecting mortality were analysed with the SPSS statistics software, version 25.0. The value of p<0.05 was considered statistically significant.

Results: The mean age of the patients was 57.9±12.9 years, however, age was higher in exitus group (p=0.013). Debridement count was significantly raised in patients with vacuum assisted closure system (p<0.001). The use of vacuum-assisted closure system was associated with a longer hospital stay (p=0.042). Both stoma creation and the use of vacuum-assisted closure system were not found as risk factors for higher mortality.

Conclusion: Stoma creation and the use of vacuum-assisted closure systems have no effect on mortality in patients of Fournier’s gangrene with anorectal involvement. Urogenital involvement may be considered as a risk factors for mortality.

Key Words: Fournier's gangrene, Vacuum-assisted closure system, Stoma, Anorectal region, Perineum, Mortality.


INTRODUCTION

Fournier's gangrene is a necrotizing and gas-forming soft tissue infection of the perineum which can expand to the anorectal region. Known common causes are undrained perianal abscess, and urogenital tract infections.¹ The gold standard treatment is still early, aggressive, and repeated wide surgical debridement of necrotic tissue.²⁻³ These debridements should be supported with broad-spectrum antibiotics and patients should be followed in the intensive care units (ICU) for their haemodynamic stabilisation.⁴⁻⁵ Mortality rates are reported to lie between 3% and 45%.⁶ In cases involving the anorectal region, there is a risk of contamination of the wound with faecal contents during and after debridements.

Therefore, the formation of a diversional stoma can facilitate healing of a less faecal-contaminated wound, reduce wound complications, and prevent the risk of sepsis and death. Unfortunately there are not enough randomised controlled trials about stoma creation indications. Studies showed that the decision for colostomy creation is based on the surgeon's personal experience and the severity of disease presentation. Normally, the decision for creating the stoma should be based on the condition of the anal sphincter tone, but in some cases it can also be used to divert faecal content.⁷ Although aggressive debridements are known as the gold standard treatment for Fournier's Gangrene, vacuum-assisted closure systems (VAC) is another treatment option. The VAC system not only contributes to the absorption of secretions in the wound with negative pressure after debridements, but also reduces faecal contamination in patients with anorectal involvement. The aim of this study was to identify the effects of stoma and VAC systems on postoperative mortality and hospital stay in patients with Fournier's gangrene.

METHODOLOGY

Patients presented to the Tepecik Training and Research Hospital Emergency Department between January 2010 and September 2021 and diagnosed as cases of Fournier's gangrene with anorectal involvement were retrospectively...
analyzed. Patients older than 18 years of age and with complete medical records were included in this study. Patients with only urogenital region involvement, younger than 18 years of age, and incomplete medical records were excluded from the study. Age, gender, comorbidities, number of debridements, presence of stoma creation, tissue culture results, and postoperative hospital stay were defined as parameters. The data of the patients were scanned through the hospital data system. Each parameter was obtained by examining each patient individually. Patients were divided into two groups as alive (n=53, 80.3%) and exitus (n=13, 19.7%). After making descriptive statistics, factors affecting mortality were analysed with multivariate analyses. Statistical analyses were done with the SPSS version 25.0. The conformity of the variables to the normal distribution were examined using Kolmogorov-Smirnov/Shapiro Wilk tests. Normally, distributed continuous variables were given as mean and standard deviation (SD), while non-normally distributed variables were given as median (Q1-Q3). In order to compare the two groups for independent and continuous variables, t-test was used in groups with normal distribution and Mann-Whitney U test was used in groups with non-normal distribution. Pearson chi-square and Fisher’s exact test were used to evaluate categorical variables. Univariate analysis was performed to find potential risk factors and then multivariate analysis to identify independent factors. The value of p<0.05 was considered statistically significant.

RESULTS
A total of 66 patients were selected from hospital records. Forty four (66.7%) of the patients were males and 22 (33.3%) of the patients were females. Thirteen (19.7%) of the patients were older than 18 years of age and with complete medical records were included in this study. Patients with only urethral region involvement, younger than 18 years of age, and incomplete medical records were excluded from the study. Age, gender, comorbidities, number of debridements, presence of stoma creation, tissue culture results, and postoperative hospital stay were defined as parameters. The data of the patients were scanned through the hospital data system. Each parameter was obtained by examining each patient individually. Patients were divided into two groups as alive (n=53, 80.3%) and exitus (n=13, 19.7%). After making descriptive statistics, factors affecting mortality were analysed with multivariate analyses. Statistical analyses were done with the SPSS version 25.0. The conformity of the variables to the normal distribution were examined using Kolmogorov-Smirnov/Shapiro Wilk tests. Normally, distributed continuous variables were given as mean and standard deviation (SD), while non-normally distributed variables were given as median (Q1-Q3). In order to compare the two groups for independent and continuous variables, t-test was used in groups with normal distribution and Mann-Whitney U test was used in groups with non-normal distribution. Pearson chi-square and Fisher’s exact test were used to evaluate categorical variables. Univariate analysis was performed to find potential risk factors and then multivariate analysis to identify independent factors. The value of p<0.05 was considered statistically significant.

Additionally univariate and multivariate analyses were done for the factors affecting mortality in patients with Fournier gangrene. Although increased age was associated with mortality (p=0.013), age was not found an independent risk factor for mortality in multivariate analysis (p=0.201). However, urogenital involvement was detected as a risk factor for mortality (p=0.039). Both stoma creation and the use of VAC systems were not effective for mortality in patients with Fournier’s gangrene involving anorectal region (Table I).

DISCUSSION
Although Fournier’s gangrene is not very common, studies have reported high mortality rates. The treatment of Fournier’s gangrene is still frequent and aggressive debridements, broad spectrum antibiotics, and general supportive treatment. Alternative treatments have not yet been developed to replace this treatment. In some studies, age is not considered as a risk factor for mortality in these patients. While DM rates were found to be increased in Fournier’s gangrene, it was evaluated as a risk factor for mortality in some studies. Although DM is a common comorbidity in this study, it was not associated with mortality. In addition, the ASA score was not associated with mortality either. Although age was found significantly increased in patients with mortality; multivariate analysis showed that age had no effect on mortality. Although the other comorbidities of the patients in this study were hypertension, coronary artery disease, chronic renal failure, chronic obstructive pulmonary disease, and malignancies (lung cancer, renal cell cancer, rectum cancer, colon cancer), none of them were associated with mortality.

Studies have reported that the stoma should be opened according to the anal sphincter tone in Fournier’s gangrene with anorectal involvement. In a study performed by Ozturk E et al., they stated that opening a stoma does not make any clinical difference in these patients even stoma causes extra costs and is not cost effective. In this study, the authors observed that stoma opening had no effect on mortality in patients diagnosed with Fournier’s gangrene with anorectal involvement.
Table I: Factors associated with mortality in patients with Fournier’s gangrene involving anorectal region.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>All patients n=66</th>
<th>Alive n=53</th>
<th>Exitus n=13</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean±SD</td>
<td>57.9±12.9</td>
<td>56±11.5</td>
<td>65.9±15.7</td>
<td>0.013*</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td></td>
<td></td>
<td></td>
<td>0.105*</td>
</tr>
<tr>
<td>Male</td>
<td>44 (66.7)</td>
<td>38 (71.7)</td>
<td>6 (46.2)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>22 (33.3)</td>
<td>15 (28.3)</td>
<td>7 (53.8)</td>
<td></td>
</tr>
<tr>
<td>ASA, n (%)</td>
<td></td>
<td></td>
<td></td>
<td>0.192</td>
</tr>
<tr>
<td>2</td>
<td>31 (47)</td>
<td>27 (50.9)</td>
<td>4 (30.8)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>35 (53)</td>
<td>26 (49.1)</td>
<td>9 (69.2)</td>
<td></td>
</tr>
<tr>
<td>Diabetes Mellitus, n (%)</td>
<td>39 (59.1)</td>
<td>30 (56.6)</td>
<td>9 (69.2)</td>
<td>0.407*</td>
</tr>
<tr>
<td>Urogenital involvement, n (%)</td>
<td>37 (56.1)</td>
<td>27 (50.9)</td>
<td>10 (76.9)</td>
<td>0.091*</td>
</tr>
<tr>
<td>Stoma creation, n (%)</td>
<td>32 (48.5)</td>
<td>24 (45.3)</td>
<td>8 (61.5)</td>
<td>0.293*</td>
</tr>
<tr>
<td>VAC system, n (%)</td>
<td>36 (54.5)</td>
<td>32 (60.4)</td>
<td>4 (30.8)</td>
<td>0.055*</td>
</tr>
<tr>
<td>Debridement count, median (Q1-Q3)</td>
<td>2 (1-3)</td>
<td>2 (1-3)</td>
<td>2 (1-3)</td>
<td>0.788*</td>
</tr>
<tr>
<td>Intensive Care Unit (ICU) stay (day), median (Q1-Q3)</td>
<td>4 (3-12.3)</td>
<td>3 (2-5)</td>
<td>12 (6-24)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Total hospital stay (day), median (Q1-Q3)</td>
<td>22.5 (14.5-34)</td>
<td>23 (17-34)</td>
<td>15 (6-29.5)</td>
<td>0.060*</td>
</tr>
</tbody>
</table>

*: independent t-test was used; †: Fisher’s Exact test was used; ¤: Chi-Square test was used; &: Mann Whitney-U test was used.

Table II: Factors affecting mortality in patients with Fournier’s gangrene.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Univariate analyses</th>
<th>p-value</th>
<th>Multivariate analyses</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds ratio (95% CI)</td>
<td></td>
<td>Odds ratio (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.070 (1.012-1.132)</td>
<td>0.013</td>
<td>1.041 (0.979-1.108)</td>
<td>0.201</td>
</tr>
<tr>
<td>Female gender</td>
<td>2.956 (0.852-10.249)</td>
<td>0.088</td>
<td>3.773 (0.831-17.127)</td>
<td>0.085</td>
</tr>
<tr>
<td>Stoma</td>
<td>1.933 (0.559-6.690)</td>
<td>0.298</td>
<td>3.141 (0.566-17.418)</td>
<td>0.190</td>
</tr>
<tr>
<td>VAC</td>
<td>0.292 (0.079-1.070)</td>
<td>0.063</td>
<td>0.433 (0.087-2.162)</td>
<td>0.307</td>
</tr>
<tr>
<td>Debridement count</td>
<td>0.881 (0.629-1.233)</td>
<td>0.460</td>
<td>0.911 (0.679-1.224)</td>
<td>0.538</td>
</tr>
<tr>
<td>Urogenital involvement</td>
<td>3.210 (0.793-12.992)</td>
<td>0.102</td>
<td>6.916 (1.105-43.290)</td>
<td>0.039</td>
</tr>
</tbody>
</table>

Another aim of this study was to determine whether the VAC system has an effect on mortality and length of hospital stay in patients with Fournier’s gangrene with anorectal involvement. VAC systems are being increasingly used in wound care to provide granulation tissue by removing the secretions from the wound. VAC systems are thought to be effective by covering the wound area from infectious elements such as stool. However, in routine practice of VAC, the wound can be opened at 72 h intervals due to the supply of materials at 72 h intervals. Although VAC systems are preferred in patients with a large wound surface because of its easier dressing with less pain and protection against contamination, it is controversial how accurate it is to see the wound at 72 h intervals in a disease such as Fournier’s gangrene that can progress within hours. In this study, it was observed that the use of VAC systems in patients with anorectal involvement did not affect mortality. In addition, it was determined that the length of hospital stay and the number of debridements were higher in patients using the VAC system. From this, one may conclude that the number of debridements were increased and wound healing was delayed due to less wound exploration in patients with VAC system.

The first limitation of this study is being a retrospective study. Secondly, the decision to open a stoma depends on the surgeon’s management of the disease. No objective scoring was used for making stoma decision. Considering these limitations, prospective multicentre randomised studies are needed in this area.

CONCLUSION

Stoma creation and the use of VAC systems have no effect on mortality in patients with Fournier’s gangrene with anorectal involvement. Urogenital involvement may be considered as a risk factors for mortality. The use of VAC systems may cause long hospital stay due to delayed wound exploration in these patients.

DISCLOSURE

This study was presented as an oral presentation in 1st Turkish International Colorectal Surgery Congress and the abstract of this study was published in European Surgery supplement issue.

ETHICAL APPROVAL:

This study was conducted retrospectively and approved by the Ethics Committee of University Hospital, on 17th January 2022 (Approval No. 20).

PATIENT’S CONSENT:

The study was performed in accordance with the Declaration of Helsinki and all patients’ written informed consents were taken after oral and written explanations were made.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS’ CONTRIBUTION:

GKT: Contributed to the design, data analysis, writing, and translation of the manuscript.
KT: Contributed to data collection, data analysis, and writing of the manuscript.
SA: Contributed to design, writing, and supervision of the manuscript. All the authors have read and approved the final version of the manuscript.

REFERENCES


