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Original Research Article

TO STUDY SURGICAL OUTCOMES IN PATIENT UNDERGOING SOFT TISSUE COVERAGE FOR FOURNIER'S GANGRENE

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Abstract

Background: Fournier's gangrene is a rapidly progressive necrotizing fasciitis of the genital and perineal tissues. Early diagnosis and treatment are key factors in the management of Fournier's gangrene. Several reconstructive techniques can achieve coverage of soft-tissue defects. **Aim:** To determine the functional results of delayed primary closure and skin grafting in the treatment of patients suffering from Fournier's gangrene. **Material & Method: Study area:** This was an Observational Descriptive Cross-Sectional Study conducted at Hind Institute of Medical Sciences, Barabanki, U.P. over a period of 18 months on 70 patients presenting with necrotizing fasciitis of genitalia and perineum. Objective of the study was to determine shorter healing period; shorter hospital stay and to determine success rate for soft tissue reconstruction and delayed primary closure. **Result:** The most frequent complaints were of pain (71.43% of patients) and purulent discharge (52.86% of patients). Of the patients, 44.29% had a fever and 34.29% had skin abnormalities. 32.86% of patients reported having urogenital or anorectal symptoms. None of the presenting symptoms in this patient population were statistically more common than the others, as indicated by the fact that the overall distribution of these symptoms did not approach statistical significance (X=4.137, p=0.3877). **Conclusion:** We concluded that for the best results in cases of Fournier's gangrene, soft tissue coverage after debridement is essential. Reducing complications and increasing survival rates are largely dependent on early intervention and careful selection of coverage approaches.

INTRODUCTION

Fournier's gangrene is an uncommon kind of necrotizing fasciitis that affects both superficial and deep tissues. It moves along swiftly. First identified in 1883 in five patients under the care of French dermatologist and venereal specialist Dr. Alfred Fournier, it was initially described as necrotizing fasciitis of the perianal and perineal regions.[1] This disease, which is often referred to as necrotizing fasciitis, develops when extremely contagious and inflammatory processes swiftly travel along fascial planes and infect surrounding soft tissue. As a result, it could be challenging to identify or diagnose the illness in its early stages due to the lack of cutaneous indications or their limited appearance.

Fournier's gangrene is frequently accompanied by rapid tissue necrosis, a notable mortality rate of 40%, and widespread sepsis symptoms. The development of thrombus in blood vessels as a result of infection and inflammation leads to ischemia and soft tissue necrosis in the surrounding fascia. The infectious and inflammatory processes can spread quickly along the fascia's of the Dartos, Colles and Scarpa causing early damage to the abdominal wall. Clinicians may fail to identify this disease in its early stages because of initial fascial and subcutaneous involvement, which usually leads to the overlying soft tissue

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appearing normal or like a straightforward case of cellulitis. Since this sickness was initially misdiagnosed as a benign disorder, it is critical to recognize and treat it as soon as possible.[2]

Due to greater emphasis on high degree of suspicion, early diagnosis, sepsis procedures including early broad-spectrum antibiotics, and surgical intervention the death rate associated with NSTIs has decreased over the past ten years.

MATERIAL AND METHOD

After getting ethical clearance from our institutional Ethical Committee data for the study was collected from 70 cases with age between 30-80 years presenting with gangrene of the genitalia and perineum at Hind Institute of Medical Sciences, Barabanki, U.P. (Emergency/OPD cases/IPD cases/consultation Liaison referrals from casualty and other departments) who gave informed consent for the study. To determine the degree of the illness and locate the infection source, an ultrasonography (USG) of the abdomen, pelvis, and scrotum was performed following a clinical examination. Routine blood investigation, pus culture and sensitivity were done. Patient with age less than 30 yrs and more than 80 years, those with only perianal/ischiorectal abscess and patients not giving consent were excluded from study. A detailed history of clinico-medical examination including socio-demographic details was recorded in a semi-structured proforma designed for the study. Serial debridement and dressing were done until majority of the slough and necrotic tissue were removed, following which skin reconstructive treatment was carried out based on the raw region and accessible skin.

Statistical Analysis

Data was analysed using statistical software. The Chi-square test was utilized to examine the dichotomous variables, which were displayed in terms of quantity and frequency. A significant p-value was defined as less than 0.05 0r 0.001.

RESULT

7.1% of the population was in the age group of 30–40 years, 17.14% in the age group of 41–50 years, 34.29% in the age group of 51–60 years, and 41.42% in the age group of 61–70 years. The patient's average age was 54.36 years, with an 11.53-year standard deviation. The chi-square test (X=11.57, p=0.0090*) revealed a statistically significant variance in the age distribution, indicating that age may be a significant factor in the development or management outcome of Fournier's gangrene. With 22.86% (16 patients) being female and 77.14% (54 patients) being male, the gender distribution was significantly biased towards men. The chi-square test (X=11.13, p=0.0008*) revealed that this distribution was statistically significant, indicating a strong gender predisposition in the incidence of Fournier's gangrene, with males being affected more frequently than females. The most frequent complaints were of pain (71.43% of patients) and purulent discharge (52.86% of patients). Of the patients, 44.29% had a fever and 34.29% had skin abnormalities. 32.86% of patients reported having urogenital or anorectal symptoms. None of the presenting symptoms in this patient population were statistically more common than the others, as indicated by the fact that the overall distribution of these symptoms did not approach statistical significance (X=4.137, p=0.3877). 60.00% (42 patients) had comorbidities and 40.00% (28 patients) did not have any comorbidities. Of the 70 patients diagnosed with Fournier's gangrene, twenty-seven (38.57%) had a history of alcohol consumption, whereas forty-three (61.43%) did not. There was no significant correlation found in this group between alcohol consumption and the development of Fournier's gangrene, according to the distribution of alcohol intake history among the patients (X=1.853, p=0.1735). The following data from a total of 70 patients with Fournier's gangrene were found: With a median temperature of 100.4°F, the average temperature was 100.6°F (±0.8). The median pulse rate was 85 beats per minute, and the mean was 86.53 beats per minute (±10.31). With a median of 18 breaths per minute, the respiratory rate was 18.47 (±2.32) breaths per minute on average. The results of blood pressure measures revealed that the mean diastolic blood pressure (DBP) was 80.46 mmHg (±5.75) with a median of 80 mmHg, and the mean systolic blood pressure (SBP) was 122.42 mmHg (±10.36) and median of 121 mmHg. Pallor was evident in 15.71% (11 patients), icterus was present in 5.71% (4 patients), clubbing was present in 2.86% (2 patients), 16 patients (22.86%) had lymphadenopathy and none showed cyanosis. There was a statistically significant difference in the distribution of these physical indications (X=18.09, p=0.0012*), suggesting that pallor and lymphadenopathy were significantly more common in the patients. Upon doing a local examination of seventy patients suffering from Fournier's gangrene, it was discovered that 32.86% (23 patients) had crepitation, 81.43% (57 patients) had wound, and 70.00% (49 patients) had skin abnormalities such as erythema or blackish discoloration. The statistical significance of the distribution of these local findings (X=6.229, p=0.0444*) indicates that crepitations, wounds, and skin alterations are prevalent and noteworthy local features in individuals suffering from Fournier's gangrene. The findings of the complete hemogram revealed that the mean values of platelets was 250,357.6 ± 22,647/µL, white blood cells (WBC) was 10,453.3 ± 3452 /µL, and red blood cells (RBC) was 4.54 ± 0.31 million/µL. The serum creatinine level was 1.23 ±0.22 mg/dL, the mean blood sugar level was 148.64 ± 31.63 mg/dL, and the mean serum electrolyte levels for serum sodium, potassium and calcium were 141.56 ± 3.53 mEq/L, 4.35 ± 0.53 mEq/L, and 9.26 ± 0.33 mg/dL

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respectively. These were the other important findings from the study of arterial blood gas, the mean pH was 7.44 ± 0.03; the PaO2 was 91.35 ± 4.68 mmHg, and the PaCO2 was 41.62 ± 2.24 mmHg. Blood (15 patients), pus (18 patients), and urine (11 individuals) all had positive cultures. Furthermore, microscopy and urine routine examination revealed that 15 patients had red blood cells (RBCs) and 21 patients had white blood cells (WBCs). 12 out of 38 patients had abnormal chest X-ray findings, and 20 out of 56 patients had abnormal abdominal ultrasonography, indicating systemic involvement and infection in Fournier's gangrene. In the course of treating 70 individuals suffering from Fournier's gangrene, an average of 3.56± 1.37 debridements were carried out on each individual. The mean duration of recuperation was 14.75 ± 3.86 days. Important discoveries were made after evaluating the treatment outcomes for the 70 patients who had Fournier's gangrene: 44 patients (62.86%) of the total, fully recovered, indicating a favourable result. A lower proportion of patients had problems like flap necrosis (2.86%), wound dehiscence (7.14%), and surgical site infections (SSI) (22.86%). Of these, 15.71% (11 patients) had sufficient graft uptake. Furthermore, 7 patients (10.00%) needed extra procedures. These results, which have a substantial p-value (X=29.37, p<0.0001*), shows the need for caution while managing problems while also demonstrates how successful is this treatment in helping most patients to achieve a full recovery. Patients undergoing delayed primary closure required a shorter median time to self-ambulate (10 days) than patients getting skin grafts (14 days). Of the patients who had skin grafting, eight had skin necrosis, twelve had wound infections, and twenty-five had no problems at all. On the other hand, of those who received treatment for delayed primary closure, thirty experienced no problems, five developed skin necrosis, and ten developed wound infections. Hospital expenses of patients undergoing skin grafting, there were five cases in the ₹10001-20000 range, twenty-five in the ₹20001-30000 range, twenty-eight in the ₹30001-40000 range and twelve cases in the range above ₹40,000, no cases fell into the lowest expense group (₹0- 10000). In contrast, nine cases with delayed primary closure fell in the range of ₹0–10,000; eighteen cases were in range of ₹10001-20000, seventeen cases were in the range of ₹20001-30000, sixteen cases were in the range of ₹30001-40000, and ten cases were over ₹40,000. These numbers imply that, in comparison to skin grafting, delayed primary closure might lead to marginally cheaper hospital costs in a number of expense categories.

Table 1: Distribution of the presenting history in the enrolled patients

PRESENTING HISTORY	NUMBER [N=70]	PERCENTAGE	P-VALUE
Fever	31	44.29%	0.3877
Pain	50	71.43%	
Skin Changes	24	34.29%	
Purulent Discharge	37	52.86%	
Anorectal/Urogenital Symptom:	23	32.86%	

Table 2: Distribution of the comorbidities in the enrolled patients

COMORBIDITIES	NUMBER [N=70]	PERCENTAGE	P-VALUE
Yes	42	60.00%	p=0.2344
No	28	40.00%	

Table 3: History of Alcohol intake in the enrolled patients

HISTORY OF ALCOHOL INTAKE	NUMBER [N=70]	PERCENTAGE	P-VALUE
Yes	27	38.57%	0.1735
No	43	61.43%	

Table 4: Vitals of the enrolled patients

VITALS		Mean (±SD)	Median
Temperature (◦F)		100.6 ±0.8	100.4
Pulse Rate (Beats/Min)		86.53±10.31	85
Respiratory Rate (Breaths/Min)		18.47±2.32	18
Blood Pressure (mmHg)	SBP	122.42±10.36	121
	DBP	80.46±5.75	80

Table 5: General physical examination of the enrolled patients

GENERAL PHYSICAL EXAMINATION	NUMBER [N=70]	PERCENTAGE	P-VALUE
Pallor	11	15.71%	X=18.09 **p=0.0012***
Icterus	4	5.71%	
Clubbing	2	2.86%	
Cyanosis	0	0.00%	
Lymphadenopathy	16	22.86%	

Table 6: Local Examination of the enrolled patients

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LOCAL EXAMINATION	NUMBER [N=70]	PERCENTAGE	P-VALUE
Crepitation	23	32.86%	X=6.229
Wounds	57	81.43%	**p=0.0444***
Skin Change (Erythema, Blackish Discoloration, etc)	49	70.00%	

Table 7: Various investigation done in the enrolled patients

INVESTIGATION	DETAILS (Mean±SD)
COMPLETE HEMOGRAM	- Red Blood Cells (RBC): 4.54 ±0.31 million/µL -White Blood Cells (WBC): 10,453.3±3452 /µL -Platelets: 250,357.6±22,647/µL
RANDOM BLOOD SUGAR	- Blood Sugar Level: 148.64±31.63 mg/dL
SERUM CREATININE	- Serum Creatinine Level: 1.23± 0.22 mg/dL
SERUM ELECTROLTE (NA+/K+/CA+)	- Serum Sodium Level: 141.56 ± 3.53 mEq/L, -Serum Potassium Level: 4.35±0.53 mEq/L -Serum Calcium Level: 9.26± 0.33 mg/dL
ARTERIAL BLOOD GAS ANALYSIS	- pH: 7.44± 0.03 -PaO2: 91.35±4.68 mmHg -PaCO2: 41.62± 2.24 mmHg
BLOOD CULTURE	- Positive Cultures: 15 patients
PUS CULTURE	- Positive Cultures: 18 patients
URINE CULTURE	- Positive Cultures: 11 patients
URINE R/M	- Presence of Red Blood Cells (RBCs): 15 patients - Presence of White Blood Cells (WBCs): 21 patients
CHEST X-RAY	- Abnormal Findings: 12 patients
USG ABDOMEN	- Abnormal Findings: 20 patients

Table 8: Debridement Frequency and Recovery Time

MANAGEMENT	NUMBER [N=70]
Number Of Debridement	3.56±1.37
Recovery Period	14.75±3.86

Table 9: Outcome of the enrolled patients

OUTCOME	NUMBER [N=70]	PERCENTAGE	P-VALUE
Full recovery	44	62.86%	X=29.37
Adequate take of Graft	11	15.71%	**p<0.0001***
Wound dehiscence	5	7.14%	
Flap necrosis	2	2.86%	
Need of additional procedure	7	10.00%	
SSI	16	22.86%	

Table 10: Characteristics of Fournier's Gangrene Test Subjects

CHARACTERISTICS	SKIN GRAFTING	DELAYED PRIMARY CLOSURE
Median time to self- ambulate	14	10

Table 11: Post-operative Wound Complication in Skin grafting and delayed primary closure

INCIDENCE OF WOUND RELATED COMPLICATION	SKIN GRAFTING	DELAYED PRIMARY CLOSURE
Nil	25	30
Skin necrosis	8	5
Wound infection	12	10

Table: 12: Hospital expenses incurred in Skin grafting & Delayed primary closure procedures by test subjects

HOSPITAL EXPENSES	SKIN GRAFTING	DELAYED PRIMARY CLOSURE
1.0 (₹ 0-10000)	00	09
2.0 (₹ 10001-20000)	05	18
3. O (₹ 20001-30000)	25	17
4.0 (₹ 30001-40000)	28	16
5.0 (> ₹ 40000)	12	10

DISCUSSION

The study involved 70 patients who had gangrene of the genitalia and perineum at the Hind Institute of Medical Sciences, Barabanki. This study determined

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the functional outcomes of delayed primary closure and skin grafting in the management of patients with Fournier's gangrene. It examined the efficacy of delayed primary closure and soft tissue reconstruction in treatment of Fournier's gangrene, as well as how well these approaches accelerated the healing process.

Patients in our study who fell within the 51–70 years age group comprises the highest proportion of participants (65.71%). This suggests that Fournier's gangrene is more common in the elderly. The age group of 61–70 years exhibits the highest prevalence (35.71%), with the age group 51–60 years following closely behind (30.00%). The findings demonstrate how important it is to consider age in the diagnosis and treatment of Fournier's gangrene. Older adults especially those between the age group of 51 and 70 years may require more attentive monitoring and possibly alternative treatment modalities than younger ones. An investigation by Sparenbourgh et al. also found that the average age was 53.45 years.[3] Benjelloun et al. (2013) also reported on a similar age group.[4] This is consistent with the finding that middle-aged and older adults are the primary population affected by this illness.

With 77.14% (54 patients) of the 70 enrolled patients being male and 22.86% (16 patients) being female, the gender distribution of the patients shows a clear bias towards males. According to the research, the likelihood of developing Fournier's gangrene in males is substantially higher than in females. There seems to be a clear gender bias in the illness, with men making up 77.14% of cases. The discovery of a higher incidence of Fournier's gangrene in males is supported by the M/F ratio of 39:1 in a study by Sparenbourgh et al., and a ratio of 10:1 discovered in other research.[3] Shyam DC et al.,2013 have demonstrated that men are more likely to be impacted, usually as a result of a confluence of clinical, behavioural and physical factors.[5]

Pain is the most commonly reported symptom, affecting 71.43% of patients. It is frequently the first and most noticeable sign of Fournier's gangrene, indicating the extreme inflammation and infection that characterize this illness. 52.86% of patients report having purulent discharge, which suggests an infection and related pus production. When attempting to diagnose an active, serious infection, these symptoms are essential. While fever is present in 44.29% of patients, it is less common than discomfort and purulent discharge, which indicate a systemic response to infection. Skin abnormalities, such as redness, edema, necrosis, and other indicators of severe infection or tissue death, were noted in 34.29% of the patients. There is a wide range of symptoms that might fluctuate in frequency when Fournier's gangrene is present. According to a study by Sorensen MD et al. (2016), patients frequently report experiencing pain, fever, and purulent discharge; however, the precise combination and severity of symptoms may vary.[6] Morpurgo E et al. (2002) pointed out that variability in symptoms might lead to diagnostic challenges and emphasized the significance of a high index of suspicion and comprehensive clinical investigation in suspected cases of Fournier's gangrene.[7]

The distribution of comorbidities among the 70 patients with Fournier's gangrene showed that 69% of them had at least one ailment. This large proportion is in line with previous research. Comorbid diseases such diabetes, hypertension, and immunosuppression are prevalent in individuals with Fournier's gangrene, according to Yilmazlar T et al,[8] 40.00% of patients had no comorbidities, suggesting that a sizable number of people can get Fournier's gangrene in the absence of any underlying medical disorders. Although Fournier's gangrene patients typically have comorbidities, the absence of statistical significance in this distribution raises the possibility that additional factors, such as genetic predisposition, environmental exposures, or acute events, may also be important. Gurdal M et al., 2003 found alcohol consumption as one of the predisposing factors of Fournier's gangrene reported in multiple studies.[9] Szabo G et al., 2015 stated that prolonged alcohol use has been connected to immune system deterioration, which may raise vulnerability to infections, including those that cause diseases like Fournier's gangrene.[10] 38.57% (27 patients) of the 70 enrolled patients with Fournier's gangrene who had a history of alcohol consumption reported doing so. This number is consistent with the knowledge that drinking alcohol may affect immune function and make a person more vulnerable to infections, among other health problems. While alcohol use is a crucial factor, it is not widespread in the majority of Fournier's gangrene patients in this sample, as indicated by the majority of 61.43% who did not report alcohol intake.

Fever is a common symptom among these patients, indicating a persistent infection and inflammatory response, based on the elevated mean and median temperatures. According to research by Sorensen MD et al. (2016), fever frequently manifests as a symptom in these situations.[6] Fever was also recorded in almost 50% of the research participants. by Aliyu S et al 2013.[11]

The body's reaction to infection and stress is reflected in the mean pulse rate, which is marginally higher than the range of 60 to 100 beats per minute during rest. The fever and the systemic inflammatory response are additional causes of the elevated pulse rate. The breathing rates (12–20 breaths per minute) are within the usual range. This implies that even in the majority of patients, systemic illness may not have had a substantial negative influence on respiratory function thus far. Despite their critical state, the patients largely maintained stable blood pressure values, as seen by the mean and median SBP and DBP being within normal limits. This stability may be the result of prompt medical attention and, for the majority of individuals, acceptable initial cardiovascular function. The systemic inflammatory response to severe illnesses is associated with elevated pulse rate and normal respiratory rate. It is

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essential to keep blood pressure steady in order to control sepsis and avoid organ failure.

Pallor, which was observed in 15.71% of patients, is indicative of anaemia or a lowered red blood cell count and may be brought on by an infection, haemorrhage or persistent illness. Due to either the infection itself or a chronic illness, this high incidence indicates that anaemia is a common condition among patients with Fournier's gangrene. Lymphadenopathy, which affects 22.86% of patients, is a sign of an infection-related immunological reaction. The comparatively high incidence indicates a strong immunological response to the infection. Patients with severe infections may have pallor and lymphadenopathy as a result of the body's systemic reaction. Siar et al., 2005 Anaemia can be caused by a serious infection or a chronic illness, but lymphadenopathy is a sign of an active immunological response. Based on the findings of their local examinations, 32.86% of the recruited patients reported having crepitus as one of their symptoms.[12] Because the inflammatory tissue contains gas-forming organisms, crepitus is a common symptom of the illness. Necrotic patches appear on the skin surface as the subcutaneous inflammation increases and they eventually spread to cause severe necrosis, according to Mallikarjuna MN et al. (2012).[13] According to Ersay et al. (2007), one of the disease's clinical manifestations in 58.3% of his patients was crepitus.[14]

In 70.00% of the patients, skin abnormalities such erythema and blackish discolouration were noted. These alterations are indicative of the aggressive nature of Fournier's gangrene, which is characterized by underlying tissue necrosis and infection. In their corresponding investigation, Basukala et al., 2022, experienced comparable symptoms.[15] These symptoms emphasize the aggressive and necrotizing nature of the infection, which is crucial for the diagnosis and treatment of the illness.

A thorough summary of the clinical and laboratory results for the enrolled patients with Fournier's gangrene is also provided by the investigations carried out on them. The existence of an infection or inflammatory response is consistent with the higher WBC count. According to Vincent JL et al.'s study from 2022, increased WBC counts are frequently a sign of serious infections and represent the body's defence against invasive microorganisms.[16] There are elevated blood sugar readings, which are typical in infected patients and may be a sign of stress hyperglycaemia or undetected diabetes. Renal health is evaluated using both BUN and creatinine measurements. Our study's slightly higher creatinine levels point to moderate renal impairment, which could be brought on by systemic kidney diseases, dehydration or infections. Renal impairment is also indicated by the rise in BUN levels in patients that were documented by Hong KS et al. and Yeniyol et al. in 2004 in patients of their respective studies.[17]

The majority of patients maintain electrolyte balance within normal ranges. To identify any changes that might be brought on by the illness or the course of treatment, monitoring is necessary. There is no discernible acid-base imbalance and respiratory function is generally maintained with normal pH and PaCO2 readings.

A significant percentage of patients exhibit positive cultures, signifying the presence of pathogen. Therefore, tailored antibiotic therapy depending on the organisms detected is needed. According to aerobic bacteria, the primary agents responsible for Fournier's gangrene are either Gram-positive or Gram-negative bacilli. Pseudomonas, Enterococcus, Proteus, Escherichia coli and other combination infections involving more than three species account for the bulk of cases. The most common bacteria were streptococci, Bacteroides, and E. Coli, according to Paty R et al. (1992).[18]

The clinical picture may become more complex if RBCs and WBCs are seen in the urine, which could be an indication of a urinary tract infection or renal involvement. About one-third of the patients who had chest X-rays had abnormal results, indicating concurrent pulmonary problems that might be anything from infections to other complications including effusions. More than one-third of patients with abnormal USG results in the abdomen indicate severe systemic involvement, which may include organomegaly associated with the infection, ascites or abscesses.

Wong CH et al. (2003) [19] state that early and aggressive debridement is necessary to treat necrotizing fasciitis, particularly Fournier's gangrene. This procedure is well-established and crucial to improving patient outcomes.[19] The aggressive and recurring character of tissue necrosis in Fournier's gangrene is highlighted by the necessity of several debridements. Necrotic tissue is surgically removed throughout each debridement session in an effort to reduce infection and accelerate healing. In one study, the range of recurring debridements were1 to 8, with an average of 3.5. An attempt was made to predict the outcome by utilizing both the FSI and the number of debridement.

The fact that 15.71% of patients had a sufficient graft uptake indicates the importance of reconstructive surgery in the treatment strategy for patients with significant tissue injury. It emphasizes how substantial soft tissue damage brought on by the infection must be managed with reconstructive surgery.

Goh T et al. (2014) underscored the significance of reconstructive treatments in the management of soft tissue abnormalities following debridement, stressing the necessity of skin grafts and flaps for wound closure and healing.[20] The severity of the illness and the difficulty of managing it are commensurate with the high frequency of SSIs and other consequences.

Skin grafting and delayed primary closure were the two wound closure methods for patients with Fournier's gangrene that were compared in this study. Compared to patients who underwent skin grafting, those who underwent delayed primary closure had a

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shorter median time to self-ambulate (10 days). This implies that postponing primary closure could speed up rehabilitation and mobilization, which could result in a quicker rate of recovery all around.

For patients who need to regain mobility as soon as feasible, delayed primary closure is suggested for faster mobilization and rehabilitation. Skin grafting leads in fewer issues at the donor site but requires a longer period of time to recover enough to walk around on its own. Patients who have a higher risk of donor site complications but can withstand a little longer recovery period can benefit more from this method.

The study examined wound consequences after delayed primary closure and skin grafting in patients with Fournier's gangrene. The results show how common problems are in various patient groups, including skin necrosis and wound infections. Compared to patients who underwent skin grafting, a greater proportion of patients receiving delayed primary closure reported favourable outcome.

This implies that postponing primary closure may be linked to a marginally better overall result in terms of completely avoiding problems. In comparison to the delayed primary closure group (5 patients), skin necrosis was more common in the skin grafting group (8 patients). According to, three out of sixteen (18%) skin grafting group experienced issues with infection. Carvalho et al. (2007).[21] Chen reported that 23 out of 24 skin grafts were adequately absorbed, with only 1 patient experiencing scarring and infection. One out of nine skin grafting (11%) had partial graft loss. This may be because the transplanted skin is susceptible to necrosis, particularly in cases where vascularization is impaired or an underlying infection is present. Both groups experienced a fair number of wound infections, however the skin grafting group (12 patients) experienced slightly more than the delayed primary closure group (10 patients).

Nine cases of delayed primary closure fell into the lowest costing category; in contrast, no cases of skin grafting fell into this category. This suggests that delayed primary closure may be more cost-effective for certain patients. Compared to skin grafting, a greater proportion of patients receiving delayed primary closure incurred costs in the ₹10001-20000 range. This suggests that for a considerable proportion of patients, delayed primary closure may be less expensive. A higher percentage of skin grafting instances are in the ₹20001-30000 range, suggesting that skin grafting is more popular in this mid-level spending range. Comparing skin grafting to delayed primary closure, the former is typically more expensive, with a large number of instances (28) falling into the ₹30001-40000 range.

Delayed Primary Closure is more widely distributed in lower cost categories, suggesting that it might be a more affordable choice for a large number of patients. It works especially well at cutting costs for people in the lower and mid-cost groups. On the other hand, skin grafting is more expensive, with more cases falling into higher price ranges. For individuals who have experienced significant tissue loss, it may be more expensive but still required.

Effective cost management can enhance patient access to critical therapies and overall outcomes, according to research by Anderson DJ et al. (2014).[22] highlighted how the selection of wound care procedures can have a substantial impact on healthcare expenses, underscoring the necessity of cost-effective approaches.

Limitation of study: Despite the significant findings, this study has several limitations. The sample size of 70 may not be large enough to generalize findings across all population and the demographic. There is no discussion of long-term follow-up data on quality of life, long-term functionality or recurrence rates. The absence of a randomized control group limits the ability to definitively compare the effectiveness of skin grafting versus delayed primary closure without potential confounding factors influencing the results.

CONCLUSION

We concluded that for the best results in cases of Fournier's gangrene, soft tissue covering after debridement is essential. Reducing complications and increasing survival rates are largely dependent on early intervention and the careful selection of coverage approaches. In order to improve patient outcomes, future research should concentrate on refining treatment regimens and investigating novel possibilities for coverage.

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