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Saving Gonads in Acute Life-Threatening Fournier's Gangrene-A Challenge: A Tertiary Care Centre Study!

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Abstract: ***Background**: Necrotising fasciitis of scrotum, also known as Fournier's Gangrene, is a rare gangrenous infection of urogenital and anorectal areas which progresses rapidly at an alarming rate. Aggressive, effective and early treatment of this condition is imperative to prevent a fatal outcome. In this study we aimed to analyse the clinical presentation of the patients presenting with Fournier's Gangrene and modalities adopted to preserve the gonads. **Methods**: Prospective observational study of 05 patients of Fournier's Gangrene admitted to General Surgery ward of a tertiary care hospital during the 18 months period between January 2016 and June 2017 was done to analyse the clinical parameters and surgical modalities with emphasis on testis preserving techniques. **Results**: 05 male patients were enrolled in the study. The mean age of the patient was 53 years. The common presenting symptoms in these patients were local pain, fever, scrotal swelling and oedema. Chronic Kidney Disease, Diabetes Mellitus and Hypertension were the predominant comorbidities in this series. The length of hospital-stay varied from 20 to 45 days (mean 29.2). The surgical modalities included serial debridement, saline and povidone iodine dressings and NPWT application followed by secondary closure. The various techniques advocated for testis preservation included creation of sub-inguinal pouch and placement of testis in the opposite hemi-scrotum. Mortality was nil. Follow-up of cases at 3 months and 06 months had a satisfactory outcome. **Conclusion**: Fournier's Gangrene is an increasingly common problem, characterized by progressive and potentially fatal infection of scrotal and perineal regions. Any delay in diagnosis is potentially catastrophic, as the concomitant delay in surgical therapy is a direct predictor of mortality.*

1. Introduction

Necrotising fasciitis of scrotum, also known as Fournier's Gangrene (Fig 1a, 1b & 1c) is a rare gangrenous infection of urogenital and anorectal areas which progresses rapidly at an alarming rate.(1)The majority of patients of Fournier's Gangrene are immunocompromised, the primary wound which would have arisen out of minor infection or trauma might have been managed easily in otherwise normal individuals. The aetiology in most cases being poly-microbial, most of the infections are born out of synergistic action between the aerobes and anaerobes.(2)Aggressive, effective and early treatment of this condition is imperative to prevent a fatal outcome.(3)In spite of the advances in care, case series have reported mortality rates in patients suffering from 'Fournier's gangrene' to the tune of 20-40%, as high as 88% in some reports.(4)

Known to common man as *"**shameful exposure of testis**"*, this condition poses a challenge to the treating surgeons on how to preserve the gonads without compromising the efficacy of surgical debridement. Even though testis is not involved by the infection due to its blood supply directly from abdominal aorta, it does pose a hindrance in the day to day wound management strategy adopted.(5)The present study was conducted with an aim to analyse the clinical presentation of the patients presenting with Fournier's Gangrene and the various modalities adopted to preserve the gonads.

Figure 1a, 1b & 1c: Initial presentation of Fournier's gangrene

2. Materials and Methods

Prospective observational study of patients diagnosed with Fournier's Gangrene &admitted to General Surgery ward of a tertiary care hospital during the 18 months period between January 2016 and June 2017 was done. The inclusion criteria included patients diagnosed as Fournier's Gangrene and undergoing debridement of scrotal and/or perineal regionalong with preservation of gonads. The study excluded patientsof Fournier's Gangrene in whom gonads could not be preserved. The diagnosis of Fournier's

Gangrene was purely clinical made by the first contact surgeon on the outpatient / emergency department to which patient presented. The clinical parameters and surgical modalities advocated, length of hospital stay and follow-up at 03 and 06 months of the study group were analysed. The clinical parameters included patient's age, source of infection, symptoms, signs and important laboratory parameters. Surgical modalities included number of debridement, surgeries done for gonadal preservation, dressing techniques and secondary closure.

3. Results

A total of 8 male patients were diagnosed & admitted as 'Fournier's gangrene' during the study period. Out of these 8 patients, testis preservation was done only in 05 male patients.The rest 3 patients were not included in the study as testis couldnot be preserved in them. The age of patients who presented with symptoms ranged from 21 to 73 years with mean age being 53 years. The average duration of symptoms was 3.6 days. The common presenting symptoms (Table 1) in these patients were local pain (100%), fever (60%), scrotal swelling and oedema (40%). Necrosis of skin overlying the scrotum was seen in one of the five patients. The focus of infection in 3 out of 5 patients were extra-scrotal in the form of thigh, perineum and gluteal area. As proven in earlier studies, the comorbidities in elderly group do have an impact on the development of Fournier's gangrene. Chronic Kidney Disease (60%), Diabetes Mellitus and Hypertension (40%) were the predominant comorbidities in our series. The common deranged haematological parameters (Table 2) encountered were leucocytosis with (5/5) and Peripheral Blood Smear indicating evidence of sepsis (3/5). Deranged Renal Parameters along with uncontrolled hyperglycaemia in spite of oral hypoglycaemic agents were also found in 3 patients. The micro-organisms isolated from the tissue samples of these patients were Escherichia coli, Klebsiella pneumoniae and Acinetobacter baumanii in 3 out of 5 patients. Two of these specimens revealed no growth, suggesting probable polymicrobial aetiology.

Table 1: Demographics

	n=5	%
Age (mean in years)	53	
Mean duration of symptoms (onset to presentation)	3.6 days	
Symptoms		
Pain	5	100
Fever	3	20
Scrotal swelling	2	40
Skin necrosis	1	20
Surrounding region	3	60
Primary Source of infection		
Scrotum	2	40
Perineal abscess	2	40
Thigh abscess	1	20
Comorbidity Profile		
Diabetes Mellitus	2	40
Hypertension	2	40
Chronic Kidney Disease	3	60
Others (Hypothyroidism, Cornoary Artery Disease)	2	40
Length of Hospital Stay (days)	20 – 45	mean 29.2

Table 2: Laboratory Parameters

	n=5	%
Leucocytosis	5	100
Peripheral Blood Smear showing sepsis	1	20
Deranged Renal Parameters	3	60
Deranged Blood Sugar	1	20
Microbiological Profile		
E. coli + Klebsiella pneumoniae	2	40
Acinetobacter baumanii	1	20
No Growth	2	40

The management protocol (Table 3) advocated in study centre was in accordance with those documented in literature. The length of hospital-stay varied from 20 to 45 days(mean 29.2). The initial management (Fig 2a, 2b & 2c) included '***serial debridement***' until all the necrotic tissues were dissected & cleared. The number of surgical debridement required was as high as 5 in one of the cases. Daily review of the wounds for any deterioration along with normal saline dressings was the standard wound management protocol followed. '***Negative Pressure Wound Therapy'***(Fig 3a, 3b & 3c) was applied with successful outcome in 3 patients, the number of settings of which varied from2 to 5. Due care was taken to preserve testis in all the patients with various techniques. Creation of ***sub-inguinal pouch*** for temporary placement of testis was one of the peculiar successful techniques tried in one of the patients. Placement of testis in the ***opposite hemi-scrotum*** was also successful in another patient. The secondary closure of the wounds (Fig 4a, 4b & 4c) was attempted with success in all the 5 patients once the scrotal exploration wounds reflected healthy granulation tissue bed. None of this subset of patients required any scrotal reconstruction techniques in the form of SSG or flap cover. During the course of the management, one patient of chronic kidney disease required multiple sessions of renal replacement therapy. The same individual required re-admission for a perineal abscess for which he underwent incision and drainage.

Table 3: Surgical Modalities

	n=5	%
Number of debridement	1 to 5	
Dressing modality		
Saline dressings	3	60
Povidone Iodine Dressings	1	20
Vacuum Assisted Closure	1	20
Testis preserving surgery		
Sub-inguinal pouch	1	20
Opposite hemi-scrotum	1	20
None	3	60
Secondary Closure	5	100

Figure 2a, 2b & 2c: Post debridement

Figure 3a, 3b & 3c: Post Negative Pressure Wound Therapy

Figure 4a, 4b & 4c: Post Secondary closure of wounds

4. Follow-up

All 05 patients were followed up at 03 and 06 months following discharge from hospital. 01 out of 05 patients had to be readmitted after 01 month following initial discharge for a perineal abscess. Wound healing was satisfactory in all 05 patients at 03 months of follow-up (Fig 5a). None of them developed surgical site infection or wound dehiscence. The same was assessed at 06 months of follow-up and found to be satisfactory. Overall patient satisfaction was 100%.

Figure 5a: Wound at 3 months follow-up

5. Discussion

The history of Fournier's Gangrene dates back to as early as 1025. Avicenna (1025), Baurienne (1764), Hudbard (1786), Luttrell (1779) and Hebbler (1848), all have given various descriptions of scrotal gangrenes. Alfred Jean Fournier in 1883 was the first to clinically describe a fulminant overwhelming rapidly progressive necrotizing infection of male genitalia in a series of four cases. Though initially described as an idiopathic entity, most cases can be traced back to a perianal or urinary tract infection, local trauma or skin condition.(4) The incidence of Fournier's Gangrene has been increasing ever since its first description. 1100 cases were reported between 1989 and 2000. (6)

Fournier's Gangrene has shown a recent trend towards older population. (7) Except for one, all other patients in our series was in the older age group (age>50 years). A variety of predisposing factors have been identified in various studies, common conditions include lower socioeconomic status, poor hygiene, debilitating diseases, alcoholism, steroid use, diabetes mellitus and immunocompromised state. (8). Diabetes is considered as one of the most common comorbid risk factor (20 – 70%) for development of Fournier's Gangrene (9). Our series also had a 40% incidence of Diabetes Mellitus. The distinctive clinical symptoms of Fournier's gangrene are intense pain and tenderness in genitalia, which may be associated with oedema, erythema, dusky appearance of the scrotal skin and gangrene of the scrotal skin. (10) Pain was the predominant symptom in this case series followed by fever and local signs. The classical pathognomic sign as described is the blackish spot on scrotal skin surrounded by erythema, was present only in 1 (one) patient Even though scrotal ultrasonography and CT scan can be used to differentiate this condition from other pathologies and identify the tissue planes involved, none of these investigations undermine the importance of early clinical diagnosis and prompt management. (3) The FGSI score (Fournier's Gangrene Severity Index) gives an objective assessment of patient status predicting the prognosis and risk stratification. Given by Loar*et al.*, this score has been validated as a sensitive tool to predict severity of the disease and mortality by many studies.(11)

Multiple debridement followed by saline dressings, Negative Pressure Wound Management strategies and Hyperbaric Oxygen Therapy have been documented in literature for the wound management. (12–14) This should be combined with empiric broad-spectrum antibiotic therapy as soon as possible, until the culture results can guide the therapy.(15) Preservation of Gonads gains importance in the setting of severe fasciitis involving full thickness loss of scrotal skin and has a psychological bearingespecially among the younger patients. Various modalities for the same are documented in literature in the form of creating thigh pouches, perineal pouches, placement of testis in the contralateral hemi-scrotum in unilateral involvement and placement in the inguinal canal. (16–18). One of the patients with unilateral involvement of hemi-scrotum in our series was managed with creation of a sub-inguinal pouch. This was possible as the infection was not spreading in to the abdominal wall skin. A high threshold for orchidectomy was advocated in the management strategy which resulted in preserving testis in all five patients.

Scrotal reconstruction is another important aspect of management modality once the period of severe illness had been dealt with. Various modalities for the same has been documented which include split skin grafts, local advancement flaps, and myo-cutaneous flaps. (15) Scrotal skin remnants provide an excellent cover and is regarded as the accepted technique in the setting of debilitating illness of the patient which preclude another major reconstructive surgery. Healing by secondary intention and loose approximation with sutures was done in all cases with successful outcome. Though studies have assessed aesthetic outcomes following scrotal reconstruction, most of these assessments were largely subjective.Testicular function needs to be assessed through testicular biopsy and sperm counts.(19)However, the requirement of such an invasive investigation in the setting of unilateral involvement and older age group needs to be justified adequately.

6. Conclusion

Fournier's Gangrene is an increasingly common problem, characterized by progressive and potentially fatal infection of scrotal and perineal regions. Early and prompt diagnosis combined with radical and often multiple surgical debridement should be the dictum of management. Any delay in diagnosis is potentially catastrophic, as the concomitant delay in surgical therapy is a direct predictor of mortality. A multidisciplinary team involving surgeon, critical care specialist, physician and nursing staff is crucial in a successful outcome. Preservation of gonads should be kept as priority especially in younger patients. Early reconstruction of scrotum should be advocated for better functional outcome. In spite of advances in critical care medicine, Fournier's Gangrene still portend a high mortality rate and significant morbidity as far as survivors are concerned. Long term research is mandated in this regard.

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