A FIVE YEAR REVIEW OF THE MANAGEMENT OF FOURNIER’S GANGRENE AT DR GEORGE Mukhari Hospital, Pretoria

by

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ABSTRACT

Background: Fournier’s Gangrene is a debilitating, rapidly progressing, necrotising fasciitis. Little is known about FG in the South African context. Most of the existing literature appears to have been carried out in Turkey. The aim of this study was therefore to gain insight into the predisposing factors and outcomes of management of this condition.

Method: A five year retrospective study was conducted on all the patients who presented with FG during this period.

Results: A total of 40 patients were admitted in the study period from September 2007 - April 2012. All the patients were Black males with an age range of 17-76 years of age. The most common predisposing factor was urethral strictures that were present in 50% of the cases. The scrotum was the most commonly affected area, and in 1 case FG had spread to the abdominal wall. The mean duration of symptoms until onset of FG was 7.13 days (SD= 5.83) and the mean length of stay in hospital was 30.13 days (SD=15.28). One patient refused hospital treatment. There was no association between age and onset of illness; and marital status and onset of illness [p>0.05]. There was also no relationship for both onset of illness [r= 0.0043] and age [r=0.295] on the length of stay in hospital. The case-fatality rate was 5% and was not influenced by the age of the patient.

Conclusion: The mean age of patients is generally lower than international reports. Unlike other countries, there is a zero incidence of FG among female patients at DGMH. Patients tend to present later, but their length of hospitalization is similar to that of patients abroad. Mortality is low at DGMH.

Recommendations: Early presentation should be encouraged to further reduce hospital stay, which will reduce health expenditure as well as patient expenses as most patients do not reside in close proximity to the hospital. HIV preventative programs need to be strengthened as unlike international reports, HIV is a significant predisposing factor.

Keywords: Fournier’s Gangrene, scrotum, urethral stricture, HIV, mortality.
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ABBREVIATIONS

BPH- Benign prostatic hyperplasia
DGMH- Dr. George Mukhari Hospital
FG- Fournier’s Gangrene
HBO- Hyperbaric Oxygen
HIV- Human Immunodeficiency Virus
MEDUNSA- Medical University of Southern Africa
MREC- Medunsa Research, Ethics and Publications Committee
RHT- Refused hospital treatment
STATEMENT OF ORIGINAL AUTHORSHIP

I declare that this dissertation, “A five year review of the management of Fournier’s Gangrene at Dr. George Mukhari Hospital, Pretoria” is my own work. All the sources used and quoted have been indicated and acknowledged by means of a complete reference list.

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January 2013
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CHAPTER 1
INTRODUCTION

1.1 Introduction

There is no existing data on the predisposing factors and mortality of Fournier’s gangrene in South Africa. This study will shed light on these factors and will allow for comparison with international data. By comparing international statistics and management of the condition there will be grounds for either improvement of the management of this condition in South Africa, and conversely it could be advantageous to the international communities’ management of this life threatening condition.

1.2 BACKGROUND

1.2.1 The setting

Dr George Mukhari Hospital (formerly Ga-Rankuwa Hospital) is a tertiary hospital associated with the Medical University of Southern Africa (Medunsa) located in the north of Pretoria, Gauteng province, just outside of Garankuwa Township. Dr George Mukhari Hospital is the second largest hospital in South Africa. It is a referral institution for many regional hospitals in the North West, Limpopo and Gauteng Provinces. It also serves a fair number of patients from Southern Africa. Most of the patients seen at the institution are of a low socio-economic status.

1.3 RESEARCH PROBLEM

The researcher could not find any study conducted in South Africa on the management of Fournier’s Gangrene and outcomes thereof. Fournier’s Gangrene is a life threatening condition and is it a relatively common condition at Dr George Mukhari Hospital. The researcher wanted to understand the impact of treatment on this condition. And to further understand the demographic characteristics of our patients. Predisposing factors classically include rectal pathology (including rectal carcinoma), diabetes mellitus, chronic renal failure, malnutrition, cirrhosis, chronic
steroid therapy, alcoholism, and morbid obesity, with Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS) as probably a newer cause (Czymek, Hildebrand, Kleemann, Roblick, Hoffmann, Jungbluth, Burk, Bruch and Kujath (2009). The researcher wants to find out what commonly predisposes our population group to this debilitating condition.

1.4 JUSTIFICATION FOR THE RESEARCH

1.4.1 Practical implications

Fournier’s Gangrene is a relatively common condition in South Africa and more needs to be done in terms researching the condition. Not much is known about its aetiology in our setting and our country as a whole.

This research will provide information on the demographic information, predisposing factors, mean time to presentation, mean length of stay in hospital, extent of the disease and outcomes of treatment.

1.5 METHODOLOGY

This study is a five year (September 2007 - April 2012) retrospective analysis of the management and outcome of Fournier’s Gangrene. The quantitative approach will be utilised in this study. The quantitative approach involves collection of data in the form of numbers and the use of statistics in data analysis (Terre Blanche & Durrheim, 2002). In addition, the researcher will ask ‘what’ and not ‘why’ or ‘how’ questions. “What” questions are indicative of a quantitative approach and “how” and “why” a qualitative approach.

Friedman (1994 cited in Bah 2005) states that the descriptive design usually involves the determination of measures of morbidity and mortality in population groups according to basic characteristics such as age, sex and geographical location. The characteristics of interest in this study will be limited to age and geographical location, as the majority of patients who present to Dr George Mukhari Hospital are Black males and are of a lower economic status.
1.6 OUTLINE OF THE REPORT

**Chapter 2-** The purpose of this chapter is to review literature on Fournier’s Gangrene. The literature review is structured in seven categories, namely (i) Age and gender; (ii) Extent of the disease; (iii) Treatment; (iv) Predisposing factors; (v) Mean stay in hospital; (vi) Onset of symptoms and (vii) Mortality.

**Chapter 3-** This chapter covers research methodology. Justification for the retrospective design and quantitative approach is given, the aims and objectives are listed, the study population and sampling is described and methods of data collection and analysis are explained. In addition ethical considerations like approval from Medunsa Research Ethics and Publications (MREC) to conduct the research, and permission from the hospital superintendent to gain access to the patient records are included here.

**Chapter 4-** This chapter covers data analysis and presentation of the results.

**Chapter 5-** This chapter compares study results to current literature on the topic. Conclusions are made on the research objectives, limitations are stated and the need for further research is determined.

1.7 CONCLUSION

This chapter provided background knowledge of the setting.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Fournier’s gangrene was first described by Baurienne in 1764 and Hebler in 1848 (Ghnnam, 2008). Decades later, Fournier described an idiopathic rapidly progressive necrotising fasciitis of the penis and scrotum in young males in 1883 (Bilali, Celiku & Bilali, 2007). Diagnosis of Fournier’s Gangrene is usually made on the basis of clinical findings. It begins insidiously, with non-specific prodromal symptoms such as malaise and scrotal discomfort (Bilali, Celiku & Bilali, 2007). Symptoms progress to pain, fever, chills, scrotal oedema and itching (Uluğ, Gedik, Girgin, Çelen & Ayaz, 2009). Czymek Hildebrand, Kleemann, Roblick, Hoffmann, Jungbluth, Burk, Bruch and Kujath (2009) found that the median time between onset of symptoms and presentation was six days. This condition is a urologic emergency that requires prompt recognition and aggressive haemodynamic stabilization.

2.2 Age and gender

Fournier’s Gangrene affects mostly men from early infancy to adulthood. Female cases of Fournier’s gangrene have been reported, but are rare. According to Czymek et al. (2009) the vast majorities of cases are in men between the third and seventh decade of life; and found in their study the median age to be 59 years. Other studies have shown the mean age to be as young as 40 (Singh, Sinha, Adhikary, Babu, Ray & Khanna, 2002).

2.3. Extent of Fournier’s Gangrene

In its modern form, Fournier’s Gangrene is a form of infective necrotising fasciitis, which affects perianal, perineal and genital regions, leading to thrombosis of subcutaneous vasculature and skin necrosis (Bilali, Celiku & Bilali, 2007). Crepitus of the scrotum or adjacent structures, along with erythema is pathognomonic for gas forming infection.
In the majority of cases of Fournier’s Gangrene, aerobic and anaerobic bacteria are synergistically involved, as result of local trauma, extended periurethral or perianal infection (Bilali, et al, 2007). In most cases (up to 95%) a perianal infection, urinary tract infection and local trauma or a cutaneous source can be identified (Kara, Muezzinoğlu, Temeltas, Dincer, Kaya, Sakarya, Coskun, 2009). The scrotum may develop a ‘glassy’ appearance and then a ‘black spot’ may appear and may produce a necrotic malodorous yellow brown discharge. Once the gangrenous phase begins a rapidly spreading subcutaneous infection develops. Regardless of mechanism of infection, Fournier’s Gangrene may spread to the perineum, scrotum, penis, legs and abdominal wall beneath the superficial perineal fascia, Colles’ fascia, Dartos layer and Scarpa’s fascia (Kara, et al., 2009).

2.4 Treatment

The standard treatment of Fournier’s gangrene is admission of the patient, and aggressive resuscitation with intravenous fluids and antibiotics, followed by debridement of damaged and necrotic tissue as far as needed to find normal tissue (Villanueva Saenz, Martinez Hernandez-Magro, Valdes Ovalle, Montes Vega, Alvarez-Tostado, 2001). Previous studies have shown that Hyperbaric Oxygen (HBO) therapy reduces mortality and enhances prognosis (Ayan, Sunamak, Paksoy, Polat, As, Sakoglu, Cetinkale & Sirin, 2005). In other studies (Czymek, et al., 2009), the use of HBO treatment at the correct pressure resulted in excellent prognosis with a very low mortality rate, some studies even reported a mortality rate of zero.

In two separate studies, Korhonen (2000 cited in Ayan, et al., 2005) reported that the mortality rate was 9.1% for patients who underwent HBO treatment. Hollabaugh, Dmochowski, Hickerson and Cox (1998 cited in Ayan, et al., 2005) reported the mortality rate as 7% for the HBO group and 42% for the non HBO group. These studies show that HBO treatment increases the partial oxygen pressure in both healthy and infected subcutaneous tissues, but more so in infected tissues and its periphery. It is thought that a high pressure of oxygen around infected tissue prevents invasion of micro-organisms effectively. All of these studies showed that HBO treatment reduces systemic toxicity, prevents extension of the necrosis, narrows the demarcation line
and provides a better prognosis when combined with surgery and wide-spectrum antibiotic therapy (Ayan, et al., 2005).

If indicated, urinary and/or faecal diversion is done. Orchiectomy and penectomy are generally not indicated in the management of Fournier’s Gangrene (Khan, 2009). Reconstructive measures performed include local skin flaps and skin grafts (Khan, 2009). The remaining wounds once clean, can be approximated.

2.5 Predisposing factors

Predisposing factors classically include rectal pathology (including rectal carcinoma), diabetes mellitus, chronic renal failure, malnutrition, cirrhosis, chronic steroid therapy, alcoholism, and morbid obesity, with Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) as probably a newer cause (Czymek, et al., 2009).

2.6 Mean length of stay in hospital

In a study by Uluğ, et al. (2009) duration of hospitalization ranged from 14-68 (mean = 31.54) days for survivors and 4-37 days (mean = 12.8) days for non survivors. In another study, Atakan, Kaplan, Kaya, Aktoz and Inci (2002) reported a mean hospital stay of 43 days.

2.7 Onset of Symptoms

The duration of symptoms prior to gangrene ranged from 3 to 14 days, with a mean of 8.09 (Atakan, et al., 2002). In another study (Uluğ, et al., 2009) the mean duration of symptoms was 6.68 days for survivors, and 5.4 days for non survivors.

2.8 Mortality

The mortality rate from Fournier’s Gangrene has a wide range and is dependent on numerous factors. According to Ghnnam (2008) Fournier’s Gangrene is a self limiting
condition with low mortality. However, despite extensive modern antibiotic regimens, aggressive debridements, improved wound care, supportive care, intensive care monitoring and anaesthetic techniques the reported overall mortality in Fournier’s gangrene ranges from 3% to 67%, because of disseminated intravascular coagulation or severe sepsis leading to multiorgan failure (Ersay, Yılmaz, Akgun, Celik, 2007). The high mortality reflects both the aggressive nature of the infection and the destructive effects of the accompanying predisposing factors. Fournier’s Gangrene Severity Index (FGSI) recently described is a good prognostic value to the patient’s evolution. Laor, Palmer, Tolia, Reid and Winter, 1995 (cited in Kara, Muezzinoğlű, Temeltas, Dîncër, Kaya, Sakarya & Coskun, 2009) introduced the FGSI based on deviation from reference ranges of 9 clinical parameters (temperature, heart rate, respiratory rate, white blood cell count, sodium level, potassium, creatinine, haematocrit, sodium bicarbonate). Each parameter was valued between 0 and 4, with the higher value assigned to the greatest deviation from normal. They determined that a FGSI of 9 and greater correlated with increased mortality.
CHAPTER THREE
METHODOLOGY

3.1 INTRODUCTION

This chapter reviews the methodology used in this research. The aims and objectives are presented, justification for the descriptive design is provided and the study population is described. This chapter also describes the sampling and how data was collected. Ethical considerations are also reviewed in this chapter.

3.2 RESEARCH AIMS AND OBJECTIVES

3.2.1 The aim of the study

To conduct a five year review of the management of Fournier’s Gangrene at Dr George Mukhari Hospital.

3.2.2 The objectives of the study

i) To assess the demographic characteristics of patients managed for Fournier’s Gangrene at Dr George Mukhari hospital, Pretoria.

ii) To determine the predisposing factors for the occurrence of Fournier’s Gangrene in the patients managed with this condition at Dr George Mukhari hospital, Pretoria.

iii) To determine the mortality rate from Fournier’s gangrene at Dr George Mukhari Hospital, Pretoria

3.2.3 Research Questions

i) What are the demographic characteristics of patients managed with Fournier’s Gangrene at Dr George Mukhari Hospital, Pretoria?

ii) What are the predisposing factors for the occurrence of Fournier’s Gangrene in the patients managed with this condition at Dr George Mukhari Hospital, Pretoria?
iii) What is the mortality rate from Fournier’s Gangrene at Dr George Mukhari Hospital, Pretoria?

3.3 JUSTIFICATION FOR THE PARADIGM AND METHODOLOGY

The quantitative approach is utilised in this study. The quantitative approach involves collection of data in the form of numbers and the use of statistics in data analysis (Terre Blanche & Durrheim, 2002). In addition, the researcher will be asking ‘what’ and not ‘why’ or ‘how’ questions. “What” questions are indicative of a quantitative approach and “how” and “why” a qualitative approach. According to Varkevisser, Pathmanathan and Brownlee (2003) analysis of quantitative data involves the production and interpretation of frequencies, tables and graphs to describe the data.

The research design is retrospective in that it reviews the management and outcome of Fournier’s Gangrene over a 5 year period, from September 2007 to April 2012.

3.4 DATA COLLECTION

The researcher collected data on all patients admitted with Fournier’s gangrene in the last five years from the patient register in the ward. This data included name and hospital file number. This information was forwarded to the relevant ward clerk to retrieve these files from the records department. These medical records contain further information, namely, the age, gender, marital status, employment status and place of residence of the patient; predisposing factors of Fournier’s gangrene, the time to presentation, the extent of the Fournier’s gangrene, treatment, the length of hospitalization and whether or not the patient was cured or died from the disease. These are the variables of interest for this study and are included in the attached data collection sheet (See Appendix C). Due to the vast array of predisposing factors of Fournier’s gangrene and the varying extent of disease, no checkboxes containing options have been included in the data collection sheet. In so doing, rich data is ensured. Coding was then executed after data collection with respect to these variables. The catchment areas of Dr George Mukhari Hospital include Limpopo, North-West and Northern Gauteng.
The study is of an exploratory nature and the first of its kind in the Department of Urology, University of Limpopo: Medunsa Campus. It has generated epidemiological information that does not exist at present.

3.5 STUDY POPULATION AND SAMPLING

3.5.1 Study population

The study population was all consecutive patients who presented with Fournier’s Gangrene at the Dr George Mukhari Hospital between September 2007 and April 2012. Forty patients were admitted in that time period. This number of patients compares favourably with international studies. For example, a 10 year review by Ersay, et al. (2006) came up with 70 patients and in another study by Czymek, et al. (2009) 33 patient records were reviewed in 11 years.

3.5.2 Sampling

Every patient admitted with Fournier’s Gangrene in the study period, was included in this study. Forty medical records were retrieved by the researcher in the said study period.

3.5.3 Exclusion criteria

Patients who were wrongly diagnosed as Fournier’s gangrene were excluded from this study.

3.6 ETHICAL CONSIDERATIONS

Firstly, approval of the research proposal was granted by the Medunsa Research Ethics and Publications Committee (MREC) before the study was carried out (See Appendix A). The study commenced after clearance was obtained from MREC. In addition, the researcher has obtained permission from the superintendent at Dr.
Consent was not obtained from the patients as there was no breach in their privacy or confidentiality as no names were used. Fournier’s gangrene is not a chronic condition, so no follow-ups will be conducted based on the information in the medical records. The management of Fournier’s gangrene is standard, and once treated, the patient is cured if caught early. However; the road to recovery is long. Death may also occur if the patient presents in an advanced stage of the condition as Fournier’s gangrene tends to be aggressive.
CHAPTER FOUR
DATA ANALYSIS AND RESULTS

4.1 INTRODUCTION

This chapter consists of three sections. The demographic characteristics of patients, namely age, marital status, employment status and place of residence, are presented in the first section as per objective one. The second section details the clinical aspects of FG and includes predisposing factors of FG, the duration of symptoms until the onset of gangrene, the extent of the disease, the length of hospitalization and treatment. In the third and final section the patient outcome is presented, i.e. whether the patient died as a result of FG.

4.2 DESCRIPTION OF THE STUDY POPULATION

All patients (N=40) who presented with Fournier’s Gangrene from September 2007 to April 2012 were included in this retrospective study. The mean age was 48.75 years (SD=16.27) and ranged from 17 years (only one patient) to 76 years (only one patient). The grouped age of patients is displayed in Figure 4.1.
Figure 4.1 Grouped age of patients

Twenty five (64.1%) of patients were married, fourteen (35.9%) were single and the marital status of one was not recorded. All patients, with the exception of one, were unemployed. The majority of patients (27.5%) who presented with FG resided in Hammanskraal and only one patient (2.5%) resided in Eersterus and Hebron respectively. The geographical location of patients is displayed in Figure 4.2.
Figure 4.2 Geographical locations of patients

4.3 CLINICAL ASPECTS OF FOURNIER’S GANGRENE

4.3.1 Predisposing Factors

The single most common predisposing factor for FG is a urethral stricture which was present in 27.5% of patients. However this percentage increased to 50% when a urethral stricture was present with other predisposing factors. See Figure 4.3 below.
Figure 4.3 Predisposing factors of patients with FG

4.3.2 Onset of illness

The duration of symptoms until onset of FG ranged from 3 to 30 days (mean = 7.13; SD= 5.83). Missing data existed for one patient. The researcher set out to determine whether older and married patients presented earlier than younger and single patients. The Fisher’s exact test was performed to determine whether this association existed.
Since the expected frequency fell below 5, the Pearson chi-square test of association is unreliable. The results are displayed in Table 4.1.

Table 4.1 Onset of illness by age and marital status

<table>
<thead>
<tr>
<th>Age</th>
<th>Onset of illness</th>
<th>Fisher's exact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7 days and less</td>
<td></td>
</tr>
<tr>
<td>17-36</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>37-56</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>57-76</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>More than 7 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.787</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>0.297</td>
</tr>
</tbody>
</table>

The results of the Fisher’s exact test do not show an association between age and onset of illness; and marital status and onset of illness [p>0.05].

4.3.3 Extent of Fournier’s Gangrene
The scrotum is the most commonly affected area with respect to FG. Only 4 (10%) of patients had FG confined to the penis only, whereas the remaining 36 (90%) presented with FG on the scrotum as well as spread to other areas. The extent of FG is presented in Table 4.2.

Table 4.2 Extent of Fournier’s Gangrene

<table>
<thead>
<tr>
<th>Extent of Disease</th>
<th>Freq.</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>27.5</td>
<td>37.5</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>22.5</td>
<td>60</td>
</tr>
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<td>4</td>
<td>7</td>
<td>17.5</td>
<td>77.5</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>2.5</td>
<td>80</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>2.5</td>
<td>92.5</td>
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<td>8</td>
<td>1</td>
<td>2.5</td>
<td>95</td>
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<td>9</td>
<td>1</td>
<td>2.5</td>
<td>97.5</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>2.5</td>
<td>100</td>
</tr>
</tbody>
</table>

Key:
1= Penis only
2= Scrotum only
3= Scrotum, penis
4= Scrotum, perineum
5= Scrotum, penis, groin
6= Scrotum, penis, perineum
7= Scrotum, penis, abdomen
8= Scrotum, penis, perineum, groin
9= Scrotum, perineum, perianal
10=Scrotum, perineum, perianal, abdominal wall

4.3.4 Length of stay

The length of stay in hospital ranged from 1 to 70 days (mean= 29.38; SD= 15.79). The patient who stayed one day in hospital refused hospital treatment (RHT). The minimum length of stay for a patient receiving treatment was 5 days. When the patient who refused hospital treatment was excluded the mean increased to 30.13 (SD=15.28). For the 2 patients who passed away in hospital, the length of stay was 8 and 41 days respectively.

The researcher set out to determine whether those patients who presented late would stay longer in hospital and whether younger patients would be discharged sooner than older patients. The results are displayed in Table 4.3.
Table 4.3 Relationship between onset of illness and age by length of stay

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent Variables</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay in hospital</td>
<td>Onset of illness</td>
<td>0.0043</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>0.295</td>
</tr>
</tbody>
</table>

The results show no relationship for both onset of illness \( r=0.0043 \) and age \( r=0.295 \) on the length of stay in hospital. This means that those patients who presented earlier did not necessarily have shorter stays in hospital, and neither did younger patients.

**4.3.5 Treatment**

All 38 patients were debrided, 1 patient refused hospital treatment and the treatment for 1 patient was not stated (missing data). Of the 38, 15 were debrided exclusively
and the remaining 23 had additional procedures done. These procedures (in addition to debridement) are presented in Figure 4.5 below.

![Figure 4.5: Treatments for FG](image)

**Figure 4.4 Frequency of additional procedures**

**4.4 MORTALITY**

FG is treatable and curable. Two patients died from FG within the past 5 years (see Figure 4.4). The case-fatality rate was then calculated.

**Case-fatality rate (percent) =**

\[
\text{No. of individuals dying during a specified period of time after disease onset or diagnosis} \times 100
\]

\[
\text{No. of individuals with the specified disease}
\]

\[
= \frac{2}{40} \times 100
\]

\[
= 5\%
\]
Figure 4.5 Outcome of Fournier’s Gangrene

The researcher then determined whether age was a significant factor with respect to mortality. Fisher’s exact test was performed to determine whether this association existed. Since the expected frequency fell below 5, the Pearson chi-square test of association is unreliable. The results are displayed in Table 4.1.

Table 4.4 Outcome of Fournier’s Gangrene by age

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Age Groups</th>
<th>Fisher's exact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17-36</td>
<td>37-56</td>
</tr>
<tr>
<td>Discharged</td>
<td>% (n)</td>
<td>% (n)</td>
</tr>
<tr>
<td>(35) 14</td>
<td>(27.5) 11</td>
<td>(32.5) 13</td>
</tr>
<tr>
<td>Deceased</td>
<td>0</td>
<td>(2.5) 1</td>
</tr>
</tbody>
</table>

Age does not influence mortality [p>0.05].
CHAPTER FIVE
CONCLUSION AND IMPLICATIONS

5.1 INTRODUCTION

Fournier’s Gangrene is a debilitating disease and affects mostly men of all ages. This study set out to review the management of Fournier’s Gangrene at Dr. George Mukhari Hospital. The demographic characteristics (age, marital status, employment status and place of residence) and the clinical aspects of FG (onset of illness, length of stay in hospital, extent of spread of disease and case-fatality rate) were obtained. In so doing, associations and possible predictors of outcome of FG at Dr. George Mukhari Hospital could be identified. This final chapter will address the findings relating to the research objectives and questions posed. The limitations of the study will also be brought to the fore, as well as recommendations.

5.2 CONCLUSIONS ABOUT RESEARCH OBJECTIVES AND HYPOTHESIS

5.2.1 Demographic Characteristics

The mean age of 48.75 years and a patient as young as 17 years is lower than reported studies. Khan (2009) reported a mean age of 54.7 years (range 39-68 years), Yanar, Taviloglu, Ertekin, Guloglu, Zorba, Cabioglu and Baspinar (2006) reported a mean age of 59.7 (range 43-88 years) and Norton, Johnson, Perry, Perry, Sehon and Zibari (2002) a mean age of 51.5 (range 30-85 years). These latter studies are consistent with other international studies as the majority reported mean ages over 50 years, with the exception of Singh, et al. (2002) with a mean age of 40 years, where four patients were less than 10 years old and the youngest only 8 months. In contrast to other studies that reported female cases, the gender of all patients was male. Since all FG case files were retrieved, it is concluded that there were no female cases of FG in the past five years.

All patients, with the exception of one, were unemployed. This shows the socioeconomic status of out patients. Access to health care facilities for treatment could be a challenge because of lack of funds. The majority of patients (27.5%) who presented with FG resided in Hammanskraal. The significance of this is that most of
our patients with Fournier’s Gangrene do not reside near the hospital. This could delay treatment and hence increase the mortality rate and morbidity. One of the two patients who demised resided in Hammanskraal.

5.2.2 Clinical aspects of Fournier’s Gangrene

5.2.2.1 Predisposing Factors

In this study, the single most common predisposing factor for FG is a urethral stricture which was present in 27.5% of patients, but increased to 50% when combined with other factors. HIV was found in 9 out of 40 patients (22.5%), which is consistent with the national prevalence rate. Diabetes was found in 8 patients (20%). In 10% of the cases no cause could be determined (4 out of 40). Perianal abscesses were responsible for 12.5% of cases (5 out of 40). Scrotal abscesses causing FG were found in 2 patients (5%). There was one case of BPH (2.5%) and post hydrocoelectomy FG (2.5%). In a study by Czymek, et al. (2009) HIV was not a major predisposing factor. However in this study, HIV plays a significant role as a predisposing factor.

Urethral strictures are also a common third world problem that is not seen as frequently in first world countries. Contrary to this study, a study in Pakistan (Khan, 2009) found that chronic renal failure, malnutrition and cirrhosis were predisposing factors.

5.2.2.2 Onset of illness

The duration of symptoms until onset of FG ranged from 3 to 30 days (mean = 7.13; SD= 5.83) in this research. The duration of symptoms prior to gangrene ranged from 3 to 14 days (Atakan, et al., 2003). In another study, Uluğ, et al. (2009) for survivors mean duration of symptoms was 6.68 days and for non survivors it was 5.4 days. These two latter studies were carried out in Turkey.
There was no association between age and onset of illness; and marital status and onset of illness. Older and married patients did not present earlier than younger and single patients.

5.2.2.3 Extent of Fournier’s Gangrene

There was no correlation between extent of disease and outcome, as measured by length of stay and mortality. The two patients who died had disease confined to the scrotum and perineum. There was no spread to the abdomen.

5.2.2.4 Treatment

Surgical debridement is the standard treatment offered internationally. DGMH conforms to this standard of treatment. In other settings HBO and debridement is used but when compared to debridement alone, outcomes are similar.

5.2.2.5 Length of hospitalization

The mean length of stay, after excluding the patient who refused hospital treatment, was 30.13 (SD=15.28). Similarly, Uluğ, et al. (2009) reported a mean duration of hospitalization to be 31.54 days for survivors. Other studies have reported higher mean hospitalization of 43 days (Atakan et al., 2002), as well as lower mean stays of 21.2 days (Norton, et al., 2002) and 19 days (Gürdal, Yücebas, Tekin, Beysel, Aslan & Şengör, 2003). No relationship existed for both onset of illness and age on the length of stay in hospital. This means that those patients who presented earlier did not necessarily have shorter stays in hospital, and neither did younger patients.

5.2.3 Mortality

Mortality is dependent on a number of factors and can range from as low as 3% to as high as 67% (Ersay, et al., 2007). The case-fatality rate at Dr George Mukhari was
determined to be at 5%. Reasons for this low mortality could be that patients are aggressively debrided as soon as possible after resuscitation. With regards to the two patients who demised, the researcher determined that the debridement was done timeously for the one patient and actually demised much later (41 days) post admission. The other patient came in a very critical condition and demised 8 days later. The surgical debridement was done two days after admission as patient was being resuscitated and there were challenges in getting the patient to theatre. Age was also not a factor with respect to mortality. The patients who demised were 51 and 69 years of age which proved not to be significant.

5.3 IMPLICATIONS FOR POLICY AND PRACTICE

The implication for policy is that FG is a costly disease entity. Mean length of stay in this study was 30 days. For a patient to stay in a tertiary hospital bed for 30 days is indeed costly. It is also costly for relatives of patients with FG to visit since most of our patients come from afar.

5.4 LIMITATIONS

All the records obtained had to be searched manually. An electronic search would have been ideal. Perhaps there are records that may have been omitted because of this method of record keeping.

5.5 FURTHER RESEARCH

The researcher would like to recommend more multi centre studies to determine the prevalence and mortality of this disease entity in the South African setting.

5.6 CONCLUSION

Fournier’s Gangrene is still a serious condition and should be treated as such despite the low mortality rate. Urethral strictures remain the most common predisposing factor in this study. Therefore, prevention and adequate treatment of sexually transmitted infections (STI’s) and HIV would reduce the incidence of FG, in this
context. Despite the limited resources and the low socio-economic status of most patients, outcomes at DGMH are excellent.
REFERENCES


Bah, S., 2005. Descriptive, ecological and cross-sectional studies. Available from CD-Rom, Epidemiology Department, University of Limpopo, Medunsa Campus.


APPENDIX A

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

MEETING: 99/2012
PROJECT NUMBER: MREC/M298/2012: PG

PROJECT:
Title: A five year review of management of Fournier’s Gangrene at Dr George Mukhari Hospital, Pretoria
Researcher: Dr R Moree
Supervisor: Prof S Mutambirwa
Co-supervisor: Prof A Sogone
Hospital Superintendent: Dr P Kgongwana (DGMH)
Department: General Surgery, Cardiothoracic Surgery, Orthopaedic Surgery, Plastic and Reconstructive Surgery & Urology
School: Medicine
Degree: MMed Urology

DECISION OF THE COMMITTEE:
MREC approved the project.

DATE: 08 November 2012

PROF GA OGUNBANJO
CHAIRPERSON MREC

The Medunsa Research Ethics Committee (MREC) for Health Research is registered with the US Department of Health and Human Services as an International Organization (D REG 00004319), as an Institutional Review Board (IRB 00005123), and functions under a Federal Wide Assurance (FWA 00000415).

Note:
i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
ii) The budget for the research will be considered separately from the protocol. PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Finding Solutions for Africa

28
### Data Collection Sheet

**Cases of Fournier’s Gangrene at Dr George Mukhari Hospital in the past 5 years.**

1. **Hospital file number:**

2. **Date of admission:**

3. **Demographic characteristics**
   3.1 **Age (in years):**
   3.2 **Place of residence:**
   3.3 **Marital status:**
   3.4 **Employment status:**

4. **Clinical aspects of FG**
   4.1 **Predisposing factors:**
   4.2 **Onset of illness:** …… days
   4.3 **Length of hospital stay** …… days
   4.4 **Extent of FG** ……………………………………………………………
   4.5 **Procedure/s done:** ……………………………………………………………

5. **Outcome of FG**
   - **Cured**
   - **Deceased**
CHAPTER 1
INTRODUCTION

1.1 Introduction

There is no existing data on the predisposing factors and mortality of Fournier’s gangrene in South Africa. This study will shed light on these factors and will allow for comparison with international data. By comparing international statistics and management of the condition there will be grounds for either improvement of the management of this condition in South Africa, and conversely it could be advantageous to the international communities’ management of this life threatening condition.

1.2 BACKROUND

1.2.1 The setting

Dr George Mukhari Hospital (formerly Ga-Rankuwa Hospital) is a tertiary hospital associated with the Medical University of Southern Africa (Medunsa) located in the north of Pretoria, Gauteng province, just outside of Garankuwa Township. Dr George Mukhari Hospital is the second largest hospital in South Africa. It is a referral institution for many regional hospitals in the North West, Limpopo and Gauteng Provinces. It also serves a fair number of patients from Southern Africa. Most of the patients seen at the institution are of a low socio-economic status.

1.3 RESEARCH PROBLEM

The researcher could not find any study conducted in South Africa on the management of Fournier’s Gangrene and outcomes thereof. Fournier’s Gangrene is a life threatening condition and is a relatively common condition at Dr George Mukhari Hospital. The researcher wanted to understand the impact of treatment on this condition. And to further understand the demographic characteristics of our patients. Predisposing factors
classically include rectal pathology (including rectal carcinoma), diabetes mellitus, chronic renal failure, malnutrition, cirrhosis, chronic steroid therapy, alcoholism, and morbid obesity, with Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS) as probably a newer cause (Czymek, Hildebrand, Kleemann, Roblick, Hoffmann, Jungbluth, Burk, Bruch and Kujath (2009). The researcher wants to find out what commonly predisposes our population group to this debilitating condition.

1.4 JUSTIFICATION FOR THE RESEARCH

1.4.1 Practical implications

Fournier’s Gangrene is a relatively common condition in South Africa and more needs to be done in terms researching the condition. Not much is known about its aetiology in our setting and our country as a whole.

This research will provide information on the demographic information, predisposing factors, mean time to presentation, mean length of stay in hospital, extent of the disease and outcomes of treatment.

1.5 METHODOLOGY

This study is a five year (September 2007 - April 2012) retrospective analysis of the management and outcome of Fournier’s Gangrene. The quantitative approach will be utilised in this study. The quantitative approach involves collection of data in the form of numbers and the use of statistics in data analysis (Terre Blanche & Durrheim, 2002). In addition, the researcher will ask ‘what’ and not ‘why’ or ‘how’ questions. “What” questions are indicative of a quantitative approach and “how” and “why” a qualitative approach.

Friedman (1994 cited in Bah 2005) states that the descriptive design usually involves the determination of measures of morbidity and mortality in population groups according to
basic characteristics such as age, sex and geographical location. The characteristics of interest in this study will be limited to age and geographical location, as the majority of patients who present to Dr George Mukhari Hospital are Black males and are of a lower economic status.

1.6 OUTLINE OF THE REPORT

Chapter 2- The purpose of this chapter is to review literature on Fournier’s Gangrene. The literature review is structured in seven categories, namely (i) Age and gender; (ii) Extent of the disease; (iii) Treatment; (iv) Predisposing factors; (v) Mean stay in hospital; (vi) Onset of symptoms and (vii) Mortality.

Chapter 3- This chapter covers research methodology. Justification for the retrospective design and quantitative approach is given, the aims and objectives are listed, the study population and sampling is described and methods of data collection and analysis are explained. In addition ethical considerations like approval from Medunsa Research Ethics and Publications (MREC) to conduct the research, and permission from the hospital superintendent to gain access to the patient records are included here.

Chapter 4- This chapter covers data analysis and presentation of the results.

Chapter 5- This chapter compares study results to current literature on the topic. Conclusions are made on the research objectives, limitations are stated and the need for further research is determined.

1.7 CONCLUSION

This chapter provided background knowledge of the setting.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Fournier’s gangrene was first described by Baurienne in 1764 and Hebler in 1848 (Ghnnam, 2008). Decades later, Fournier described an idiopathic rapidly progressive necrotising fasciitis of the penis and scrotum in young males in 1883 (Bilali, Celiku & Bilali, 2007). Diagnosis of Fournier’s Gangrene is usually made on the basis of clinical findings. It begins insidiously, with non-specific prodromal symptoms such as malaise and scrotal discomfort (Bilali, Celiku & Bilali, 2007). Symptoms progress to pain, fever, chills, scrotal oedema and itching (Uluğ, Gedik, Girgin, Çelen & Ayaz, 2009). Czymek Hildebrand, Kleemann, Roblick, Hoffmann, Jungbluth, Burk, Bruch and Kujath (2009) found that the median time between onset of symptoms and presentation was six days. This condition is a urologic emergency that requires prompt recognition and aggressive haemodynamic stabilization.

2.2 Age and gender

Fournier’s Gangrene affects mostly men from early infancy to adulthood. Female cases of Fournier’s gangrene have been reported, but are rare. According to Czymek et al. (2009) the vast majorities of cases are in men between the third and seventh decade of life; and found in their study the median age to be 59 years. Other studies have shown the mean age to be as young as 40 (Singh, Sinha, Adhikary, Babu, Ray & Khanna, 2002).

2.3 Extent of Fournier’s Gangrene

In its modern form, Fournier’s Gangrene is a form of infective necrotising fasciitis, which affects perianal, perineal and genital regions, leading to thrombosis of subcutaneous vasculature and skin necrosis (Bilali, Celiku & Bilali, 2007). Crepitus of the scrotum or adjacent structures, along with erythema is pathognomonic for gas forming infection.
In the majority of cases of Fournier’s Gangrene, aerobic and anaerobic bacteria are synergistically involved, as result of local trauma, extended periurethral or perianal infection (Bilali, et al, 2007). In most cases (up to 95%) a perianal infection, urinary tract infection and local trauma or a cutaneous source can be identified (Kara, Muezzinoğlu, Temeltas, Dincer, Kaya, Sakarya, Coskun, 2009). The scrotum may develop a ‘glassy’ appearance and then a ‘black spot’ may appear and may produce a necrotic malodorous yellow brown discharge. Once the gangrenous phase begins a rapidly spreading subcutaneous infection develops. Regardless of mechanism of infection, Fournier’s Gangrene may spread to the perineum, scrotum, penis, legs and abdominal wall beneath the superficial perineal fascia, Colles’ fascia, Dartos layer and Scarpa’s fascia (Kara, et al., 2009).

2.4 Treatment

The standard treatment of Fournier’s gangrene is admission of the patient, and aggressive resuscitation with intravenous fluids and antibiotics, followed by debridement of damaged and necrotic tissue as far as needed to find normal tissue (Villanueva Saenz, Martinez Hernandez-Magro, Valdes Ovalle, Montes Vega, Alvarez-Tostado, 2001). Previous studies have shown that Hyperbaric Oxygen (HBO) therapy reduces mortality and enhances prognosis (Ayan, Sunamak, Paksoy, Polat, As, Sakoglu, Cetinkale & Sirin, 2005). In other studies (Czymek, et al., 2009), the use of HBO treatment at the correct pressure resulted in excellent prognosis with a very low mortality rate, some studies even reported a mortality rate of zero.

In two separate studies, Korhonen (2000 cited in Ayan, et al., 2005) reported that the mortality rate was 9.1% for patients who underwent HBO treatment. Hollabaugh, Dmochowski, Hickerson and Cox (1998 cited in Ayan, et al., 2005) reported the mortality rate as 7% for the HBO group and 42% for the non HBO group. These studies show that HBO treatment increases the partial oxygen pressure in both healthy and infected subcutaneous tissues, but more so in infected tissues and its periphery. It is thought that a high pressure of oxygen around infected tissue prevents invasion of micro-
organisms effectively. All of these studies showed that HBO treatment reduces systemic toxicity, prevents extension of the necrosis, narrows the demarcation line and provides a better prognosis when combined with surgery and wide-spectrum antibiotic therapy (Ayan, et al., 2005).

If indicated, urinary and/or faecal diversion is done. Orchietomy and penectomy are generally not indicated in the management of Fournier’s Gangrene (Khan, 2009) Reconstructive measures performed include local skin flaps and skin grafts (Khan, 2009). The remaining wounds once clean, can be approximated.

2.5 Predisposing factors

Predisposing factors classically include rectal pathology (including rectal carcinoma), diabetes mellitus, chronic renal failure, malnutrition, cirrhosis, chronic steroid therapy, alcoholism, and morbid obesity, with Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome (HIV/AIDS) as probably a newer cause (Czymek, et al., 2009).

2.6 Mean length of stay in hospital

In a study by Uluğ, et al. (2009) duration of hospitalization ranged from 14-68 (mean = 31.54) days for survivors and 4-37 days (mean = 12.8) days for non survivors. In another study, Atakan, Kaplan, Kaya, Aktoz and Inci (2002) reported a mean hospital stay of 43 days.

2.7 Onset of Symptoms

The duration of symptoms prior to gangrene ranged from 3 to 14 days, with a mean of 8.09 (Atakan, et al., 2002). In another study (Uluğ, et al., 2009) the mean duration of symptoms was 6.68 days for survivors, and 5.4 days for non survivors.
2.8 Mortality

The mortality rate from Fournier’s Gangrene has a wide range and is dependent on numerous factors. According to Ghnnam (2008) Fournier’s Gangrene is a self limiting condition with low mortality. However, despite extensive modern antibiotic regimens, aggressive debridements, improved wound care, supportive care, intensive care monitoring and anaesthetic techniques the reported overall mortality in Fournier’s gangrene ranges from 3% to 67%, because of disseminated intravascular coagulation or severe sepsis leading to multiorgan failure (Ersay, Yilmaz, Akgun, Celik, 2007). The high mortality reflects both the aggressive nature of the infection and the destructive effects of the accompanying predisposing factors. Fournier’s Gangrene Severity Index (FGSI) recently described is a good prognostic value to the patient’s evolution. Laor, Palmer, Tolia, Reid and Winter, 1995 (cited in Kara, Muezzinoğlu, Temeltas, Dinçer, Kaya, Sakarya & Coskun, 2009) introduced the FGSI based on deviation from reference ranges of 9 clinical parameters (temperature, heart rate, respiratory rate, white blood cell count, sodium level, potassium, creatinine, haematocrit, sodium bicarbonate). Each parameter was valued between 0 and 4, with the higher value assigned to the greatest deviation from normal. They determined that a FGSI of 9 and greater correlated with increased mortality.
CHAPTER THREE
METHODOLOGY

3.1 INTRODUCTION

This chapter reviews the methodology used in this research. The aims and objectives are presented, justification for the descriptive design is provided and the study population is described. This chapter also describes the sampling and how data was collected. Ethical considerations are also reviewed in this chapter.

3.2 RESEARCH AIMS AND OBJECTIVES

3.2.1 The aim of the study

To conduct a five year review of the management of Fournier’s Gangrene at Dr George Mukhari Hospital.

3.2.2 The objectives of the study

i) To assess the demographic characteristics of patients managed for Fournier’s Gangrene at Dr George Mukhari hospital, Pretoria.

ii) To determine the predisposing factors for the occurrence of Fournier’s Gangrene in the patients managed with this condition at Dr George Mukhari hospital, Pretoria.

iii) To determine the mortality rate from Fournier’s gangrene at Dr George Mukhari Hospital, Pretoria

3.2.3 Research Questions

i) What are the demographic characteristics of patients managed with Fournier’s Gangrene at Dr George Mukhari Hospital, Pretoria?
ii) What are the predisposing factors for the occurrence of Fournier’s Gangrene in the patients managed with this condition at Dr George Mukhari Hospital, Pretoria?

iii) What is the mortality rate from Fournier’s Gangrene at Dr George Mukhari Hospital, Pretoria?

### 3.3 JUSTIFICATION FOR THE PARADIGM AND METHODOLOGY

The quantitative approach is utilised in this study. The quantitative approach involves collection of data in the form of numbers and the use of statistics in data analysis (Terre Blanche & Durrheim, 2002). In addition, the researcher will be asking ‘what’ and not ‘why’ or ‘how’ questions. “What” questions are indicative of a quantitative approach and “how” and “why” a qualitative approach. According to Varkevisser, Pathmanathan and Brownlee (2003) analysis of quantitative data involves the production and interpretation of frequencies, tables and graphs to describe the data.

The research design is retrospective in that it reviews the management and outcome of Fournier’s Gangrene over a 5 year period, from September 2007 to April 2012.

### 3.4 DATA COLLECTION

The researcher collected data on all patients admitted with Fournier’s gangrene in the last five years from the patient register in the ward. This data included name and hospital file number. This information was forwarded to the relevant ward clerk to retrieve these files from the records department. These medical records contain further information, namely, the age, gender, marital status, employment status and place of residence of the patient; predisposing factors of Fournier’s gangrene, the time to presentation, the extent of the Fournier’s gangrene, treatment, the length of hospitalization and whether or not the patient was cured or died from the disease. These are the variables of interest for this study and are included in the attached data collection sheet (See Appendix C). Due to the
vast array of predisposing factors of Fournier’s gangrene and the varying extent of disease, no checkboxes containing options have been included in the data collection sheet. In so doing, rich data is ensured. Coding was then executed after data collection with respect to these variables. The catchment areas of Dr George Mukhari Hospital include Limpopo, North-West and Northern Gauteng.

The study is of an exploratory nature and the first of its kind in the Department of Urology, University of Limpopo: Medunsa Campus. It has generated epidemiological information that does not exist at present.

3.5 STUDY POPULATION AND SAMPLING

3.5.1 Study population

The study population was all consecutive patients who presented with Fournier’s Gangrene at the Dr George Mukhari Hospital between September 2007 and April 2012. Forty patients were admitted in that time period. This number of patients compares favourably with international studies. For example, a 10 year review by Ersay, et al. (2006) came up with 70 patients and in another study by Czymek, et al. (2009) 33 patient records were reviewed in 11 years.

3.5.2 Sampling

Every patient admitted with Fournier’s Gangrene in the study period, was included in this study. Forty medical records were retrieved by the researcher in the said study period.

3.5.3 Exclusion criteria

Patients who were wrongly diagnosed as Fournier’s gangrene were excluded from this study.
3.6 ETHICAL CONSIDERATIONS

Firstly, approval of the research proposal was granted by the Medunsa Research Ethics and Publications Committee (MREC) before the study was carried out (See Appendix A). The study commenced after clearance was obtained from MREC. In addition, the researcher has obtained permission from the superintendent at Dr. George Mukhari Hospital, Dr F Kgongwana, for use of the medical records in this study.

Consent was not obtained from the patients as there was no breach in their privacy or confidentiality as no names were used. Fournier’s gangrene is not a chronic condition, so no follow-ups will be conducted based on the information in the medical records. The management of Fournier’s gangrene is standard, and once treated, the patient is cured if caught early. However; the road to recovery is long. Death may also occur if the patient presents in an advanced stage of the condition as Fournier’s gangrene tends to be aggressive.
CHAPTER FOUR
DATA ANALYSIS AND RESULTS

4.1 INTRODUCTION

This chapter consists of three sections. The demographic characteristics of patients, namely age, marital status, employment status and place of residence, are presented in the first section as per objective one. The second section details the clinical aspects of FG and includes predisposing factors of FG, the duration of symptoms until the onset of gangrene, the extent of the disease, the length of hospitalization and treatment. In the third and final section the patient outcome is presented, i.e. whether the patient died as a result of FG.

4.2 DESCRIPTION OF THE STUDY POPULATION

All patients (N=40) who presented with Fournier’s Gangrene from September 2007 to April 2012 were included in this retrospective study. The mean age was 48.75 years (SD=16.27) and ranged from 17 years (only one patient) to 76 years (only one patient). The grouped age of patients is displayed in Figure 4.1.
Figure 4.1 Grouped age of patients

Twenty five (64.1%) of patients were married, fourteen (35.9%) were single and the marital status of one was not recorded. All patients, with the exception of one, were unemployed. The majority of patients (27.5%) who presented with FG resided in Hammanskraal and only one patient (2.5%) resided in Eersterus and Hebron respectively. The geographical location of patients is displayed in Figure 4.2.
Figure 4.2 Geographical locations of patients

4.3 CLINICAL ASPECTS OF FOURNIER’S GANGRENE

4.3.1 Predisposing Factors

The single most common predisposing factor for FG is a urethral stricture which was present in 27.5% of patients. However this percentage increased to 50% when a urethral stricture was present with other predisposing factors. See Figure 4.3 below.
4.3.2 Onset of illness

The duration of symptoms until onset of FG ranged from 3 to 30 days (mean = 7.13; SD= 5.83). Missing data existed for one patient. The researcher set out to determine whether older and married patients presented earlier than younger and single patients. The
Fisher’s exact test was performed to determine whether this association existed. Since the expected frequency fell below 5, the Pearson chi-square test of association is unreliable. The results are displayed in Table 4.1.

**Table 4.1 Onset of illness by age and marital status**

<table>
<thead>
<tr>
<th>Age</th>
<th>Onset of illness</th>
<th>Fisher's exact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7 days and less</td>
<td>More than 7 days</td>
</tr>
<tr>
<td>17-36</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>37-56</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>57-76</td>
<td>12</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Onset of illness</th>
<th>Fisher's exact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Single</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

The results of the Fisher’s exact test do not show an association between age and onset of illness; and marital status and onset of illness [p>0.05].
4.3.3 Extent of Fournier’s Gangrene

The scrotum is the most commonly affected area with respect to FG. Only 4 (10%) of patients had FG confined to the penis only, whereas the remaining 36 (90%) presented with FG on the scrotum as well as spread to other areas. The extent of FG is presented in Table 4.2.

Table 4.2 Extent of Fournier’s Gangrene

<table>
<thead>
<tr>
<th>Extent of Disease</th>
<th>Freq.</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>27.5</td>
<td>37.5</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>22.5</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>17.5</td>
<td>77.5</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>2.5</td>
<td>80</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>10</td>
<td>90</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>2.5</td>
<td>92.5</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>2.5</td>
<td>95</td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>2.5</td>
<td>97.5</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>2.5</td>
<td>100</td>
</tr>
</tbody>
</table>

Key:
1 = Penis only
2 = Scrotum only
3 = Scrotum, penis
4 = Scrotum, perineum
5 = Scrotum, penis, groin
6 = Scrotum, penis, perineum
7 = Scrotum, penis, abdomen
8 = Scrotum, penis, perineum, groin
9 = Scrotum, perineum, perianal
10 = Scrotum, perineum, perianal, abdominal wall

4.3.4 Length of stay

The length of stay in hospital ranged from 1 to 70 days (mean= 29.38; SD= 15.79). The patient who stayed one day in hospital refused hospital treatment (RHT). The minimum length of stay for a patient receiving treatment was 5 days. When the patient who refused hospital treatment was excluded the mean increased to 30.13 (SD=15.28). For the 2 patients who passed away in hospital, the length of stay was 8 and 41 days respectively.
The researcher set out to determine whether those patients who presented late would stay longer in hospital and whether younger patients would be discharged sooner than older patients. The results are displayed in Table 4.3.

Table 4.3 Relationship between onset of illness and age by length of stay

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent Variables</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of stay in hospital</td>
<td>Onset of illness</td>
<td>0.0043</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>0.295</td>
</tr>
</tbody>
</table>

The results show no relationship for both onset of illness \( r = 0.0043 \) and age \( r = 0.295 \) on the length of stay in hospital. This means that those patients who presented earlier did not necessarily have shorter stays in hospital, and neither did younger patients.
4.3.5 Treatment

All 38 patients were debrided, 1 patient refused hospital treatment and the treatment for 1 patient was not stated (missing data). Of the 38, 15 were debrided exclusively and the remaining 23 had additional procedures done. These procedures (in addition to debridement) are presented in Figure 4.5 below.

![Figure 4.4 Frequency of additional procedures](image)

**4.4 MORTALITY**

FG is treatable and curable. Two patients died from FG within the past 5 years (see Figure 4.4). The case-fatality rate was then calculated.

\[
\text{Case-fatality rate (percent)} = \frac{\text{No. of individuals dying during a specified period}}{\text{No. of individuals with the specified disease}} \times 100
\]

\[
= \frac{2}{40} \times 100
\]

= 5%
Figure 4.5 Outcome of Fournier’s Gangrene

The researcher then determined whether age was a significant factor with respect to mortality. Fisher’s exact test was performed to determine whether this association existed. Since the expected frequency fell below 5, the Pearson chi-square test of association is unreliable. The results are displayed in Table 4.1.

Table 4.4 Outcome of Fournier’s Gangrene by age

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Age Groups</th>
<th>Fisher's exact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17-36</td>
<td>% (n)</td>
</tr>
<tr>
<td>Discharged</td>
<td>(35) 14</td>
<td>(27.5) 11</td>
</tr>
<tr>
<td>Deceased</td>
<td>0</td>
<td>(2.5) 1</td>
</tr>
</tbody>
</table>

Age does not influence mortality [p>0.05].
CHAPTER FIVE
CONCLUSION AND IMPLICATIONS

5.1 INTRODUCTION

Fournier’s Gangrene is a debilitating disease and affects mostly men of all ages. This study set out to review the management of Fournier’s Gangrene at Dr. George Mukhari Hospital. The demographic characteristics (age, marital status, employment status and place of residence) and the clinical aspects of FG (onset of illness, length of stay in hospital, extent of spread of disease and case-fatality rate) were obtained. In so doing, associations and possible predictors of outcome of FG at Dr. George Mukhari Hospital could be identified. This final chapter will address the findings relating to the research objectives and questions posed. The limitations of the study will also be brought to the fore, as well as recommendations.

5.2 CONCLUSIONS ABOUT RESEARCH OBJECTIVES AND HYPOTHESIS

5.2.1 Demographic Characteristics

The mean age of 48.75 years and a patient as young as 17 years is lower than reported studies. Khan (2009) reported a mean age of 54.7 years (range 39-68 years), Yanar, Taviloglu, Ertekin, Guloglu, Zorba, Cabioglu and Baspinar (2006) reported a mean age of 59.7 (range 43-88 years) and Norton, Johnson, Perry, Perry, Sehon and Zibari (2002) a mean age of 51.5 (range 30-85 years). These latter studies are consistent with other international studies as the majority reported mean ages over 50 years, with the exception of Singh, et al. (2002) with a mean age of 40 years, where four patients were less than 10 years old and the youngest only 8 months. In contrast to other studies that reported female cases, the gender of all patients was male. Since all FG case files were retrieved, it is concluded that there were no female cases of FG in the past five years.

All patients, with the exception of one, were unemployed. This shows the socioeconomic status of out patients. Access to health care facilities for treatment could be a challenge
because of lack of funds. The majority of patients (27.5%) who presented with FG resided in Hammanskraal. The significance of this is that most of our patients with Fournier’s Gangrene do not reside near the hospital. This could delay treatment and hence increase the mortality rate and morbidity. One of the two patients who demised resided in Hammanskraal.

5.2.2 Clinical aspects of Fournier’s Gangrene

5.2.2.1 Predisposing Factors

In this study, the single most common predisposing factor for FG is a urethral stricture which was present in 27.5% of patients, but increased to 50% when combined with other factors. HIV was found in 9 out of 40 patients (22.5 %), which is consistent with the national prevalence rate. Diabetes was found in 8 patients (20%). In 10% of the cases no cause could be determined (4 out of 40). Perianal abscesses were responsible for 12.5% of cases (5 out of 40). Scrotal abscesses causing FG were found in 2 patients (5%). There was one case of BPH (2.5%) and post hydrocoelectomy FG (2.5%). In a study by Czymek, et al. (2009) HIV was not a major predisposing factor. However in this study, HIV plays a significant role as a predisposing factor.

Urethral strictures are also a common third world problem that is not seen as frequently in first world countries. Contrary to this study, a study in Pakistan (Khan, 2009) found that chronic renal failure, malnutrition and cirrhosis were predisposing factors.

5.2.2.2 Onset of illness

The duration of symptoms until onset of FG ranged from 3 to 30 days (mean = 7.13; SD=5.83) in this research. The duration of symptoms prior to gangrene ranged from 3 to 14 days (Atakan, et al., 2003). In another study, Uluğ, et al. (2009) for survivors mean duration of symptoms was 6.68 days and for non survivors it was 5.4 days. These two latter studies were carried out in Turkey.
There was no association between age and onset of illness; and marital status and onset of illness. Older and married patients did not present earlier than younger and single patients.

### 5.2.2.3 Extent of Fournier’s Gangrene

There was no correlation between extent of disease and outcome, as measured by length of stay and mortality. The two patients who died had disease confined to the scrotum and perineum. There was no spread to the abdomen.

### 5.2.2.4 Treatment

Surgical debridement is the standard treatment offered internationally. DGMH conforms to this standard of treatment. In other settings HBO and debridement is used but when compared to debridement alone, outcomes are similar.

### 5.2.2.5 Length of hospitalization

The mean length of stay, after excluding the patient who refused hospital treatment, was 30.13 (SD=15.28). Similarly, Uluğ, et al. (2009) reported a mean duration of hospitalization to be 31.54 days for survivors. Other studies have reported higher mean hospitalization of 43 days (Atakan et al., 2002), as well as lower mean stays of 21.2 days (Norton, et al., 2002) and 19 days (Gürdal, Yücebas, Tekin, Beysel, Aslan & Şengör, 2003). No relationship existed for both onset of illness and age on the length of stay in hospital. This means that those patients who presented earlier did not necessarily have shorter stays in hospital, and neither did younger patients.
5.2.3 Mortality

Mortality is dependent on a number of factors and can range from as low as 3% to as high as 67% (Ersay, et al., 2007). The case-fatality rate at Dr George Mukhari was determined to be at 5%. Reasons for this low mortality could be that patients are aggressively debrided as soon as possible after resuscitation. With regards to the two patients who demised, the researcher determined that the debridement was done timeously for the one patient and actually demised much later (41 days) post admission. The other patient came in a very critical condition and demised 8 days later. The surgical debridement was done two days after admission as patient was being resuscitated and there were challenges in getting the patient to theatre. Age was also not a factor with respect to mortality. The patients who demised were 51 and 69 years of age which proved not to be significant.

5.3 IMPLICATIONS FOR POLICY AND PRACTICE

The implication for policy is that FG is a costly disease entity. Mean length of stay in this study was 30 days. For a patient to stay in a tertiary hospital bed for 30 days is indeed costly. It is also costly for relatives of patients with FG to visit since most of our patients come from afar.

5.4 LIMITATIONS

All the records obtained had to be searched manually. An electronic search would have been ideal. Perhaps there are records that may have been omitted because of this method of record keeping.

5.5 FURTHER RESEARCH

The researcher would like to recommend more multi centre studies to determine the prevalence and mortality of this disease entity in the South African setting.
5.6 CONCLUSION

Fournier’s Gangrene is still a serious condition and should be treated as such despite the low mortality rate. Urethral strictures remain the most common predisposing factor in this study. Therefore, prevention and adequate treatment of sexually transmitted infections (STI’s) and HIV would reduce the incidence of FG, in this context. Despite the limited resources and the low socio-economic status of most patients, outcomes at DGMH are excellent.
REFERENCES


Bah, S., 2005. Descriptive, ecological and cross-sectional studies. Available from CD-Rom, Epidemiology Department, University of Limpopo, Medunsa Campus.


APPENDIX A

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

MEETING: 08/2012
PROJECT NUMBER: MREC/M/298/2012: PG
PROJECT:
Title: A five year review of management of Fournier's Gangrene at Dr George Mukhari Hospital, Pretoria
Researcher: Dr R Menco
Supervisor: Prof S Mutambirwa
Co-supervisor: Prof A Segone
Hospital Superintendent: Dr F Kgongwana (DGMPH)
Department: General Surgery, Cardiothoracic Surgery, Orthopaedic Surgery, Plastic and Reconstructive Surgery & Urology
School: Medicine
Degree: MMed Urology

DECISION OF THE COMMITTEE:
MREC approved the project.

DATE: 08 November 2012

PROF GA OGUNBANJO
CHAIRPERSON MREC

The Medunsa Research Ethics Committee (MREC) for Health Research is registered with the US Department of Health and Human Services as an International Organisation (IRC03904319), as an Institutional Review Board (IRB00005122), and functions under a Federalwide Assurance (FWA00005419)
Expiry date: 11 October 2016

Note:
i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
ii) The budget for the research will be considered separately from the protocol. PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Finding Solutions for Africa
APPENDIX B

Data Collection Sheet

Cases of Fournier’s Gangrene at Dr George Mukhari Hospital in the past 5 years.

1. Hospital file number:

2. Date of admission:

3. Demographic characteristics

3.1 Age (in years):

3.2 Place of residence:

3.3 Marital status:

3.4 Employment status:

4. Clinical aspects of FG

4.1 Predisposing factors:

4.2 Onset of illness: …… days

4.3 Length of hospital stay …… days

4.4 Extent of FG ……………………………………………………………

4.5 Procedure/s done: ……………………………………………………………

5. Outcome of FG

Cured

Deceased