European Journal of
Health Sciences
(EJHS)

Fournier's Gangrene Post Circumcision in a Tertiary Hospital in Southern Nigeria

Abhulimen Victor and Gbobo Isesoma Francis

European Journal of Health Sciences
ISSN 2520-4645 (online)
Vol.7, Issue 5, pp 28 - 38, 2022

www.ajpojournals.org

Fournier's Gangrene Post Circumcision in a Tertiary Hospital in Southern Nigeria

Abhulimen Victor[1] and Gbobo Isesoma Francis[2*]

[1]Division of Urology, Department of Surgery, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria.

[2]Paediatric Surgery Unit, Department of Surgery, University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria.

[*]Corresponding Author's Email: isesomag@gmail.com

Abstract

Purpose: Fournier's gangrene is a rapidly progressing necrotizing fasciitis. It is a true urological emergency. It is a relatively rare condition. The aim was to highlight the presentation and management of Fournier's gangrene following circumcision.

Methodology: This was a retrospective study. Eight patients who presented with features of Fournier's gangrene post circumcision between January 2012 and December 2021 to University of Port Harcourt Teaching Hospital UPTH were included in the study. A questionnaire was used to obtain data from all patients listed in the medical records department as having been treated for Fournier's gangrene during the study period. Data collected include age at presentation, level of education of mother, duration of symptoms before presentation, who carried out the circumcision, where the circumcision was carried out, number of debridement carried out and complications. The data was entered using Microsoft Excel 2016 version and transferred into the statistical package for social sciences (SPSS) for windows (version 20) (IBM SPSS Inc. Chicago, IL) for analysis. Categorical data was presented in the form of frequencies and percentages using tables. Continuous variables were presented in means and standard deviation. Results were presented in tables and charts.

Findings: A total of eight patients had FG following circumcision. The median age was 14days and range was from 10 days to 10years. The parents of most patients (87.5%) presented with no formal education or primary level of education. Most patients (62.5%) presented 4 to 6 days after onset of symptoms. Five out of 8 had their circumcision by a traditional attendant. Three patients had complications. One patient died. Circumcision can be a predisposing factor to FG especially if it is carried out at home, and by untrained personnel. Early presentation and management gives the best outcome.

Recommendation: Only trained personnel should carry out circumcision. When parents or caregivers notice any unusual change post circumcision, they should present immediately to the hospital.

Keywords: *Fournier's gangrene, post circumcision, necrotizing fasciitis*, *neonate*.

INTRODUCTION

Fournier's Gangrene (FG) is a rapidly spreading necrotizing fasciitis that spreads through the superficial and deep fascial layers in the perineal, genital, or perianal regions, causing multiple organ failure, septic shock and sometimes death.[1,2,3] The disease affects men, women[4,5] and even children.[6] FG was first described by Baurienne in 1764, but Jean Alfred Fournier, a Parisian Venereologist, is more commonly credited with discovering the disease.[3] There are also biblical accounts of Fourniers gangrene and King Herod is believed to have suffered from Fournier's gangrene.[3]

FG is considered to be a polymicrobial infection caused by multiple organisms, including aerobic and anaerobic species such as Escherichia coli and Bacteroides fragilis. These microorganisms act synergistically leading to release of enzymes that cause tissue necrosis.[1] These enzymes include collagenases, which cause rapid tissue destruction at a rate of one inch per hour, allowing the infection to quickly spread from the genital region to the anterior abdominal wall and vital organs.[1] The spread of the infection involves the Colle's fascia and, by extension, the Campers fascia. This eventually leads to endarteritis of the superficial branches of the external pudendal and internal pudendal arteries that supply the penis and scrotum.[7] The testes are supplied by the testicular artery which is a direct branch of the abdominal aorta and hence the testes are usually not affected by FG.

Circumcision is the removal of the foreskin of the penis. Circumcision is one of the commonest surgical operations performed worldwide. Circumcision is carried out for religious reasons, hygienic reasons, control of Human Immunodeficiency Virus (HIV), recurrent urinary tract infection, recurrent balanitis, phimosis, paraphimosis and prevention of penile cancers.[8] Circumcision is considered relatively safe. However, circumcision is associated with some complications and Fournier's gangrene is one of them. Trauma to the penis is a recognized route for the introduction of microorganism and exposure of the wound to contaminants from stool and urine are believed to be associated risk factors.[3] Factors that can reduce a patient's immunity are known risk factors associated with FG and they include diabetes, chronic alcoholism, immunodeficiency, chronic steroid abuse, oncologic conditions, cytotoxic drugs, malnutrition, and low socioeconomic status.[9] Fournier's gangrene associated with diabetes mellitus is mostly associated with mortality.[10]

A review of 1726 patients with Fournier's gangrene has been carried out by Eke in 2000.[2] A study of neonatal Fournier's gangrene has also been carried out by Okoro et al.[6] This study aims to highlight the fact that circumcision in boys can be an important predisposing factor to Fournier's gangrene.

Materials and Methods

This was a retrospective study. Eight patients who presented with features suggestive of Fournier's gangrene between January 2012 and December 2021 who presented to University of Port Harcourt Teaching Hospital UPTH were included in the study. Port Harcourt is a major capital city in the Niger Delta, the oil and gas zone in Nigeria. A questionnaire was used to obtain data from all patients listed in the medical records department as having been treated for Fournier's gangrene during the study period. Data obtained from ward admission registers, theatre, and discharge records. The information gotten included history, duration of symptoms, examination findings and

treatment received. Patients who had FG not associated with circumcision were excluded from the study. All patients with in complete records were also excluded from the study.

Data collated include age at presentation, level of education of mother, duration of symptoms before presentation, who carried out the circumcision, where the circumcision was carried out, number of debridement carried out and complications.

All patients with FG had immediate fluid resuscitation and wound swab Microscopy Culture and Sensitivity was carried out. They had a broad-spectrum antibiotic (intravenous ceftriaxone and metronidazole) till the result of MCS was available. When the sensitivity result became available, the antibiotic was changed to the most sensitive from the result. All had immediate surgical debridement of all necrotic tissues. All patients had sitz bath and natural honey dressing daily. Wounds were assessed daily and repeat debridement carried out if necessary.

The wounds healed secondarily and no patient had reconstructive surgery. The data from the folders were collated and entered using Microsoft Excel 2016 version and transferred into the statistical package for social sciences (SPSS) for windows (version 20) (IBM SPSS Inc. Chicago, IL) for analysis. Categorical data was presented in the form of frequencies and percentages using tables. Continuous variables were presented in means and standard deviation. Results were presented in tables and charts.

Figure 1: Fournier's gangrene of the penile shaft

Figure 2: Fournier's gangrene affecting mainly the glans

Figure 3: Glans necrosis secondary to Fournier's gangrene

RESULTS

A total of eight patients had FG following circumcision. None were circumcised in University of Port Harcourt Teaching Hospital UPTH. The median age was 14days and range was from 10 days to 10years.

Table 1: Age distribution of patients

Age	Frequency	Percentage (%)
Neonate	6	75
1month to 12months	1	12.5
13months to 10yrs	1	12.5
Total	**8**	**100**

Range =10 days to 10 years

Median age = 14days

Table 2: Level of education of the mother, no mother with Fournier's gangrene post circumcision had tertiary level of education.

Level of Education	Frequency (n)	Percentage (%)
No formal education	2	25
Primary	5	62.5
Secondary	1	12.5
Tertiary	0	0
Total	**8**	**100**

Table 3 shows that only one patient presented within three days of onset of symptoms, most patients presented within 4 to 6days. Two patients even presented 7 days after onset of symptoms.

Table 3: Duration of symptoms before presentation

Duration of symptoms before presentation	Frequency (n)	Percentage (%)
1 to 3 days	1	12.5
4 to 6 days	5	62.5
Above 7 days	2	25
Total	**8**	**100**

Table 4 shows that 62.5% of the patients with Fournier's gangrene were circumcised by a traditional attendant. No medical doctor circumcised any of the patients.

Table 4: Who carried out the circumcision?

Who carried out the circumcision	Frequency (n)	Percentage (%)
Traditional attendant	5	62.5%
Auxiliary nurse	3	37.5%
Doctor	0	0
Total	**8**	**100**

Table 5 showing the number of debridement the patient had. Patients were assessed daily and had repeat debridement if necessary.

Table 5: Number of debridement

Number of debridement	Frequency (n)	Percentage (%)
1 to 2	4	50%
3 to 4	2	25%
Above 5	2	25%
Total	**8**	**100%**

Table 6a shows that 37.5% of patients had complications while 62.5% had no complication.

Table 6a: Presence of complications

Complications	Frequency (n)	Percentage (%)
Present	3	37.5
Absent	5	62.5
Total	**8**	**100**

Table 6b shows that abnormal glans was the most common form of complication due to necrosis of the glans.

Table 6b: Type of complication

Complication	Frequency (n)	Percentage (%)
Abnormal glans	2	25
Mortality	1	12.5
NO complication	5	62.5
Total	**8**	**100**

DISCUSSION

An infection occurs when the invasion and multiplication of microorganisms in body tissues result in cellular injury because of competitive metabolism, toxins, intracellular replication, or antigen-antibody response.[11] Variables such as virulence of organism, nature of wound and host defense mechanisms are important factors. For an infection to occur the virulence of the microorganism must supersede the host defense mechanisms. The immunity of a neonate is poorly developed and as such may not be competent in fighting against the polymicrobial organisms associated with FG.[12,13,14] There are epigenetic regulation of pediatric and neonatal immune systems which may account for the relative immunosuppression.[12]The median age of Fournier's gangrene in this study is 14days. Several studies carried out on FG have a higher mean age.[2,7,9.] The median age in this study was 14days as shown in Table 1. At this age, most children have poorly developed immunity and this could be a factor that led to FG. A five-year retrospective review of FG between April 2016 and March 2021 noted a median age of 22days.[6]

This study revealed that patient's whose mother had no formal education or primary level of education were more likely to develop FG post circumcision as revealed in Table 2. The study revealed that 87.5% of patients with no formal education (25%) or only primary level of education (62.5%) had FG. No patient with tertiary level of education developed FG post circumcision in this study. A retrospective study conducted in Kenya amongst 146 patients revealed a similar finding of low educational status.[15] Patients with poor level of education are unlikely to seek adequate healthcare and ultimately have poorer outcome.[15] Mothers of boys with tertiary level of education are less likely to be circumcised at home by a traditional attendants.

Prompt presentation to the hospital is important for patients with FG. Fournier's gangrene is a true urological emergency and early presentation to the hospital and early management is vital to recovery. Most (62.5%) patients presented to the hospital 4 to 6 days after onset of symptoms as shown in Table 3. Some patients in Africa have a poor health seeking behavior which leads to worsening of symptoms and poorer prognosis. A descriptive cross-sectional study conducted among 337 civil servants working in the Federal Secretariat, Ibadan discovered that members of the poorest quartile were 6 times more likely to have inappropriate health seeking behavior than the richest quartile (Q4:Q1= 5.83; O.R: 16.12, 95% C.I: 2.61-11.03). Also, patients with low educational status and who paid out of pocket were least likely to seek adequate healthcare.[16] The low level of education in this study can account for the delay in presentation. Patients in Africa also have certain religious believes and believe in alternative medicine and this also affects early presentation to a health care professional.[17] Another reason for delay in presentation may be because of prior attempt at the use of herbal medications.[7] In adult patients with FG, delay was due to reluctance to present with complaints on the external genitalia.[7]

Circumcision is a very common surgical procedure. However, it should not be viewed as a simple procedure. Circumcision undertaken in nonclinical settings and by untrained personnel can have significant adverse consequences, even death.[18,19] Traditional circumcision is an important ritual in certain communities in Africa, and seen as an initiation into manhood.[19] Traditional circumcision is carried out by untrained medical personnel and can have severe consequences.[19] Most (62.5%) patients presenting with FG in this study were circumcised by a traditional attendant as shown in Table 4. These patients were also circumcised at home. These factors may have led to the development of FG in this index study. An auxiliary nurse, also known as a health care assistant

works closely with a healthcare professional in providing standard care to patients. Three patients who developed FG were circumcised by an auxiliary nurse without supervision from a qualified nurse or doctor. This may also be a factor in development of FG.

All the patients in the study group had adequate resuscitation using intravenous fluids and antibiotics. Every child had debridement of all dead and necrotic tissues. Twenty five percent of patients in this study had 5 or more debridement as shown in Table 5, these Patients had a more serious from of FG. The rate at which a patient receives surgical treatment has a direct correlation with survival.[1] Hence, the more frequent the debridement, the better the overall outcome. All patients had daily sitz bath and daily dressing with natural honey.

The term sitz bath is derived from the German word Sitzbad, meaning a bath (Bad) in which one sits (sitzen).[20] It is used to relieve discomfort and pain in the lower part of the body and works by keeping the affected area clean. A supersaturated solution of salt is made with warm water. The warm water causes vasodilatation thereby and increasing blood flow to the perineal areas. The supersaturated solution prevents further bacterial proliferation. Debridement was also noticed to be easier after sitz bath. Oyelowo et al also noticed similar findings with salt solution.[7]

The beneficial effects of honey to wound healing are well documented.[21-24] Honey is associated with anti-microbial, immunomodulatory, anti-toxin, and antioxidant properties.[22] Honey is also beneficial in this age of antibiotic resistance and also acts synergistically with antibiotics to eradicate infection.[21] Patients had honey dressing. Other authors used povidone iodine dressing with good results.[7,10,25] Povidone-iodine is bactericidal with antimicrobial activity against Gram-positive and Gram-negative bacteria, fungi and protozoa. Some agents such as Edinburgh University Solution of Lysol EUSOL and hydrogen peroxide are no longer routinely used.

Some authors have spoken about the use of hyperbaric oxygen to achieve wound closure with good results.[26-29] Hyperbaric oxygen serves as an adjunct in management of FG. Some other authors are skeptical about its use.[3,30] Vacuum assisted devices are also believed to improve wound healing and recovery in patients with FG.[31-34] Hyperbaric oxygen therapy and vacuum assisted devices were not used in our study because they are currently unavailable in our centre.

Three out of eight (37.5%) presented with complications. With the most common complication being an abnormality of the glans as shown in Table 6. One patient died during treatment from severe sepsis and multiple organ dysfunction despite management. Mortality in this study was 12.5%. Okoro et al.[6] also noticed a mortality of 4 out of 16 which is 25%. FG in that study seemed to involve the scrotum and perineum more compared to this study that involved more of the penis. This may have accounted for the higher mortality in their study compared to this.

CONCLUSION

Circumcision can be a predisposing factor to FG especially if it is carried out in at home, and by untrained personnel. Early presentation and immediate management gives the best outcome.

RECOMMENDATION

Only trained personnel should carry out circumcision. When parents or caregivers notice any unusual change post circumcision, they should present immediately to the hospital.

Limitations of the Study

This study is limited by its low sample size although FG is rare and FG post circumcision is even rarer.

Conflict of Interests

The authors declare no conflict of interest

Source of Funding

This research was self-funded by the authors

ORCID ID

Victorabhulimen80@gmail.com 0000-0002-9268-1725

References

1. Lewis GD, Majeed M, Olang CA, Patel A, Gorantla VR, Davis N, Gluschitz S. Fournier's gangrene diagnosis and treatment: a systematic review. Cureus. 2021 Oct 21;13(10).
2. Eke N. Fournier's gangrene: a review of 1726 cases. British Journal of Surgery. 2000 Jun;87(6):718-28.
3. Eke N, Raphael JE. Fournier's Gangrene. In:Vitin A, editor. Gangrene: Current Concepts and Management Options (Internet). London: IntechOpen;2011(cited 2022 Sep 26) Available from: https://www.inttechopen.com/chapters/18914 doi:10.5772/24293.
4. Michael P, Peiris B, Ralph D, Johnson M, Lee WG. Genital Reconstruction following Fournier's Gangrene. Sexual Medicine Reviews. 2022 Aug 23.
5. Serrano Olave A, Bueno Moral AI, Martínez Bañón C, González Mesa E, Jiménez López JS. Fournier's Gangrene under Sodium–Glucose Cotransporter-2 Inhibitors Therapy in Gynecological Patients. International Journal of Environmental Research and Public Health. 2022 May 21;19(10):6261.
6. Philemon E O, Promise W I, Ezioma A A, Chinwendu A O, Princewill N. Neonatal Fournier's gangrene; pattern and predisposing factors in a tertiary health facility in Southern Nigeria. Tropical Doctor. 2022 Jan;52(1):42-5.
7. Oyelowo N, Ahmed M, Lawal AT, Sudi A, Tolani AM, Fidelis L, Bello A, Maitama HY. Fournier's gangrene: Presentation and predictors of mortality in Zaria, Nigeria. Annals of African Medicine. 2021 Apr;20(2):105.
8. Francis GI, Victor A. Management of Meatal Stenosis in Port Harcourt: A Ten-Year Retrospective Study. Open Journal of Urology. 2022 Aug 18;12(8):411-20.
9. Huayllani MT, Cheema AS, McGuire MJ, Janis JE. Practical Review of the Current Management of Fournier's Gangrene. Plastic and Reconstructive Surgery Global Open. 2022 Mar;10(3).
10. Chalya PL, Igenge JZ, Mabula JB, et al..Fournier's gangrene at a tertiary health facility in northwestern Tanzania: a single centre experiences with 84 patients. BMC Research Notes. 2015; 8:1–7.
11. Smith PW, Watkins K, Hewlett A. Infection control through the ages. American journal of infection control. 2012 Feb 1;40(1):35-42.
12. Bermick J, Schaller M. Epigenetic regulation of pediatric and neonatal immune responses. Pediatric Research. 2022 Jan;91(2):297-327.

13. Yu JC, Khodadadi H, Malik A, Davidson B, Salles ÉD, Bhatia J, Hale VL, Baban B. Innate immunity of neonates and infants. Frontiers in immunology. 2018 Jul 30; 9:1759.
14. Sanidad KZ, Amir M, Ananthanarayanan A, Singaraju A, Shiland NB, Hong HS, Kamada N, Inohara N, Núñez G, Zeng MY. Maternal gut microbiome–induced IgG regulates neonatal gut microbiome and immunity. Science Immunology. 2022 Jun 10;7(72): eabh3816.
15. Ngugi P, Magoha G, Nyaga P. Fournier's gangrene in the HIV era. African health sciences. 2014;14(4):1063-8.
16. Latunji OO, Akinyemi OO. Factors influencing health-seeking behaviour among civil servants in Ibadan, Nigeria. Annals of Ibadan postgraduate medicine. 2018 Jul 17;16(1):52-60.
17. Iyalomhe GB, Iyalomhe SI. Health-Seeking Behaviour of Nigerian Rural Dwellers: Implications for Healthcare Professionals. Challenges in Disease and Health Research Vol. 7. 2021 May 5:117-25.
18. Peltzer K, Nqueketo A, Petros G, Kanta X. Traditional circumcision during manhood initiation rituals in the Eastern Cape, South Africa: a pre-post intervention evaluation. BMC public Health. 2008; 8:64.
19. Banwari M. Dangerous to mix: culture and politics in a traditional circumcision in South Africa. African health sciences. 2015 Mar 12;15(1):283-7.
20. Dictionary OE. Oxford english dictionary. Simpson, Ja & Weiner, Esc. 1989;3.
21. Yupanqui Mieles J, Vyas C, Aslan E, Humphreys G, Diver C, Bartolo P. Honey: An Advanced Antimicrobial and Wound Healing Biomaterial for Tissue Engineering Applications. Pharmaceutics. 2022 Aug;14(8):1663.
22. Nikhat S, Fazil M. History, phytochemistry, experimental pharmacology and clinical uses of honey: A comprehensive review with special reference to Unani medicine. Journal of Ethnopharmacology. 2022 Jan 10; 282:114614.
23. Abraham SA, Yashavanth G, Deveswaran R, Bharath S, Azamathulla M, Shanmuganathan S. Honey based hydrogel as delivery system for wound healing. Materials Today: Proceedings. 2022 Jan 1; 49:1709-18.
24. Molan PC. The role of honey in the management of wounds. Journal of wound care. 1999 Sep;8(8):415-8.
25. Ghnnam W. Fournier ' s gangrene in Mansoura Egypt: A review of 74 cases. J Postgrad Med 2020; 54:106-9.
26. Michalczyk Ł, Grabińska A, Banaczyk B, Braszko M, Andrychowicz A, Ząbkowski T. Efficiency of Hyperbaric Oxygen Therapy Combined with Negative-Pressure Wound Therapy in the Treatment Strategy of Fournier's Gangrene–A Retrospective Study. Urology Journal. 2021 Aug 16:6797-.
27. Creta M, Longo N, Arcaniolo D, Giannella R, Cai T, Cicalese A, De Nunzio C, Grimaldi G, Cicalese V, De Sio M, Autorino R. Hyperbaric oxygen therapy reduces mortality in patients with Fournier's Gangrene. Results from a multi-institutional observational study. Minerva Urologica e Nefrologica= The Italian Journal of Urology and Nephrology. 2020 Feb 19;72(2):223-8.
28. Auerbach J, Bornstein K, Ramzy M, Cabrera J, Montrief T, Long B. Fournier gangrene in the emergency department: diagnostic dilemmas, treatments and current perspectives. Open Access Emergency Medicine: OAEM. 2020; 12:353.

29. Raizandha MA, Hidayatullah F, Kloping YP, Rahman IA, Djatisoesanto W, Rizaldi F. The role of hyperbaric oxygen therapy in Fournier's Gangrene: A systematic review and meta-analysis of observational studies. International braz j urol. 2022 Aug 26; 48:771-81.
30. de Bessa Júnior J. Hyperbaric oxygen therapy in Fournier's gangrene. International braz j urol. 2022 Aug 26; 48:782-3.
31. Syllaios A, Davakis S, Karydakis L, Vailas M, Garmpis N, Mpaili E, Kyros E, Felekouras E, Papalampros A. Treatment of Fournier's gangrene with vacuum-assisted closure therapy as enhanced recovery treatment modality. in vivo. 2020 May 1;34(3):1499-502.
32. Erickson BA, Flynn KJ. Management of Necrotizing Soft Tissue Infections (Fournier's Gangrene) and Surgical Reconstruction of Debridement Wound Defects. Urologic Clinics. 2022 Aug 1;49(3):467-78.
33. Pastore AL, Palleschi G, Ripoli A, Silvestri L, Leto A, Autieri D, Maggioni C, Moschese D, Petrozza V, Carbone A. A multistep approach to manage Fournier's gangrene in a patient with unknown type II diabetes: surgery, hyperbaric oxygen, and vacuum-assisted closure therapy: a case report. Journal of medical case reports. 2013 Dec;7(1):1-5.
34. Sobrado LF, Averbach P, Jayme VR, de Camargo MG, Sobrado CW, Nahas SC. Fournier's Gangrene During Pregnancy in a Patient with Crohn's Disease. The American Journal of Case Reports. 2022;23: e934942-1.