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Review Article

Management of Scrotal Loss in Fournier's Gangrene: Thigh Pouch as a Potential Definitive Option in Patients with Multiple Comorbidities

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Abstract

Purpose: To evaluate management of scrotal loss in patients with Fournier's Gangrene (FG) and consequence of relocation of testes into anteromedial thigh pouches as a definitive treatment approach following extensive debridement.

Methods: In a retrospective chart review of patients with FG from 2007 to 2012, we identified 32 patients. We reviewed patients' demographics, medical comorbidities, length of stay, surgical or reconstructive procedures performed and involvement of surgical services. In cases managed by the thigh pouch procedure, testicular size followed by serial scrotal ultrasounds, when possible.

Results: Mean patients' age was 56.28 year and BMI was 30.7. Common risk factors included diabetes mellitus (65.6%), obesity (58.8%), hypertension (53.1%), COPD (21.9%), prostate cancer (15.6%), and chronic renal failure (12.5%). Median number of procedures performed was five. We experienced a 12.5% mortality rate due to FG. On average patients stayed 22.5 days in the hospital. Five of the 32 patients (16%) required orchiectomy: four unilateral and one bilateral. In four patients (13%), primary closure of the scrotum was achieved. In 10 patients (31.3%), split-thickness skin grafts applied to reconstruct the scrotum. Three cases did not have significant scrotal involvement. Thigh pouch was performed in 10 of the 32 patients (three unilateral and seven bilateral), in one of nine testicles, testicular volume decreased after thigh pouch procedure.

Conclusion: Insertion of testicles into thigh pouches can serve both as a temporary modality to preserve the exposed testicles and facilitate wound care healing and as a long-term surgical solution, especially in older patients and patients with multiple comorbidities.

Introduction

Fournier's Gangrene is a necrotizing fasciitis of the genital and perineal regions. This extremely morbid condition has mortality rate ranging from 3 to 45 percent depending on the severity at presentation [1,2]. Risk factors for developing Fournier's gangrene include medical conditions such as diabetes mellitus [3,4], immunosuppression [4], Chronic Obstructive Pulmonary Disease (COPD) [4], local trauma [5], HIV infection [6], perirectal or perianal infections, and in rare cases, genitourinary surgeries such as herniorrhaphy [5]. A variety of other comorbidities are associated with increased mortality including hypertension, congestive heart failure, renal failure, coagulopathy and advanced age [3]. Initial management of these patients typically involves extensive debridement of all involved tissues and stabilization of sepsis. After the initial management, these patients are often left with exposed deep subcutaneous tissue. While perineal tissues can be adequately managed with skin grafting, management of the testicles and scrotum is significantly more challenging. Testicles pose a unique risk due to their sensitivity to temperature regulation and risk of torsion: therefore, optimal management of the testicles is not clear. The objective of this study is to review our single institutional strategies for management of testicles following initial debridement and stabilization.

Methods

We performed a retrospective chart review of all patients diagnosed with Fournier's Gangrene in our institution. All patients with ICD-9 (608.83) coding at time of admission from 2007 to 2012

were included. The Institutional Review Board of our institution approved this study. We retrospectively reviewed patients' charts, assessing the need for a multimodal surgical approach including colorectal, plastic and reconstructive, or emergency general surgery teams. We also assessed the required number of surgical procedures to complete debridement and final reconstruction. We focused on the management of testes following extensive debridement to determine if thigh pouch testicular relocation with or without reconstructive skin grafts could produce acceptable long-term outcomes.

We reviewed several variables, including patient demographics, medical comorbidities, length of stay, body mass index, number and type of surgical or reconstructive procedures, and cause of death for deceased patients. In patients managed by thigh pouch procedure who returned for follow up, testicular size evaluated by scrotal ultrasounds. We identified 32 patients based on our selection criteria and confirmed the diagnosis by presence of necrotic tissue in operative and pathological findings. We defined Fournier's gangrene specific mortality as death within 30 days of presentation with Fournier's gangrene. Patient care at the time of diagnosis included early empiric wide spectrum antibiotic therapy and urgent surgical excision. Following surgery, the patients were admitted to the intensive care unit for treatment and monitoring according to our hospital's sepsis protocol policies. When stable, patients underwent a secondary surgical debridement and were assessed intra-operatively for testicular management including relocation into anteromedial thigh pouches or undergoing a skin grafting procedure in future. Decision for thigh pouching versus skin grafting without thigh pouch was a multi-disciplinary decision and based on attending physician preferences. Primary closure with native scrotal tissue was the first choice whenever possible. All patients were offered further reconstruction following creation of the thigh pouch. Orchiectomy performed only in the setting of testicular necrosis confirmed by Doppler ultrasound. Testicle size was assessed by ultrasound in compliant patients with anteromedial thigh pouch relocation in follow up visits and was compared to measurement in preoperative Computerized-Tomography (CT) scan (if available). Patient satisfaction with thigh pouch as a definitive reconstructive strategy was assessed with a typical medical interview by their urologist.

Results

We highlighted each individual patient clinical course, amount of skin excised, and final management of testicles in Table 1. Mean patient age was 56.28 years with an interquartile range of 16.5. Mean BMI was 30.7 with an interquartile range of 5.3. The most common medical risk factors seen in this study were diabetes mellitus (65.6%), obesity (58.8%), hypertension (53.10%), COPD (21.9), and chronic renal failure (12.5%) (Table 2). The median number of procedures per patient was five (Table 2). Five of the 32 patients (16%) required orchiectomy: four unilateral and one bilateral. In four of the 32 patients (13%), primary closure of the scrotum was possible. In 10 cases an anteromedial thigh pouch was constructed. Three pouches were unilateral and seven were bilateral. In 10 patients, split-thickness skin grafts were used to reconstruct the scrotum. Three patients did not have significant scrotal involvement, obviating the need for scrotal reconstruction or testicular displacement. A multi-specialty approach was typically utilized at our center, with only 4 (12.5%) cases treated by a single surgical specialty (Table 3).

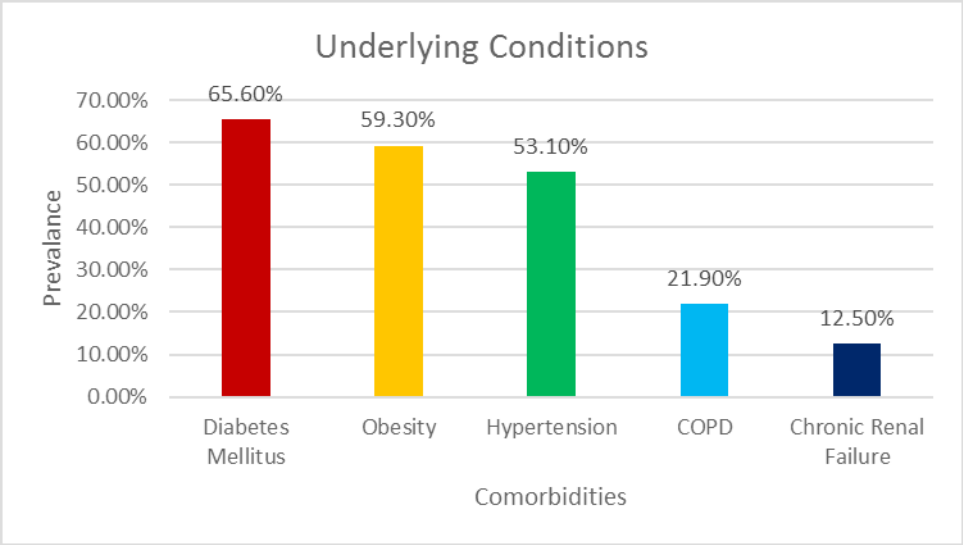
Patient Number	Age	Number of Procedures	Tissue Excised (CM^2)	Expired Due to Fournier's	Reconstruction
1	37	4	110	No	STSG
2	50	4	*	No	STSG
3	66	6	650	No	BL orchiectomy, STSG
4	48	3	650	No	STSG
5	60	7	280	No	Delayed closure with VAC
6	55	9	*	No	STSG, urethrostomy
7	61	2	*	No	primary closure
8	68	6	1740	No	STSG
9	52	5	650	No	R. orchiectomy
10	50	3	*	No	STSG

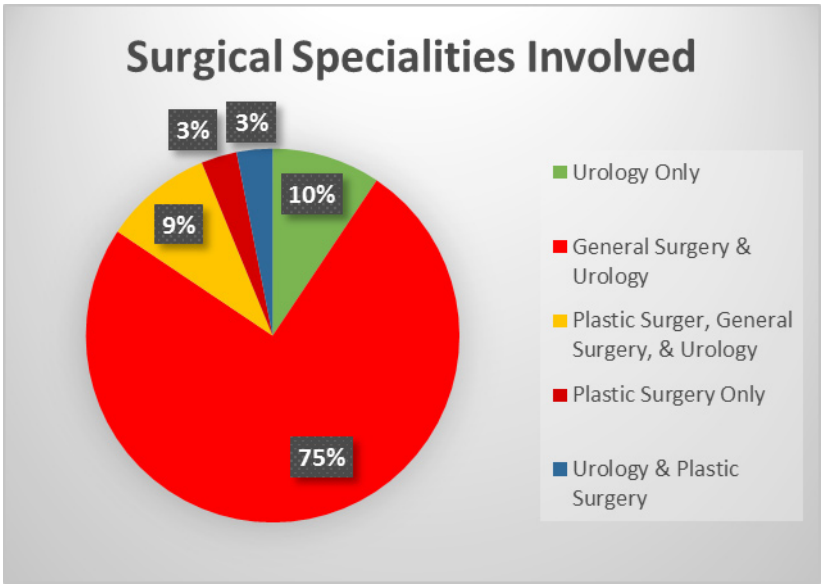
11	73	5	150	No	R. orchiectomy, primary closure
12	25	2	*	No	Primary closure
13	62	4	*	No	STSG
14	78	5	*	No	STSG
15	36	6	5650	Yes	Multiple debridements
16	62	7	*	No	STSG
17	62	2	*	No	Primary closure
18	46	3	1400	Yes	None
19	56	5	400	No	STSG
20	62	4	125	No	R. orchiectomy, STSG
21	47	1	1995	Yes	None
22	70	4	*	No	STSG
23	58	4	45	No	BL thigh pouch, STSG
24	51	6	1175	No	BL thigh pouch, STSG
25	86	3	75	Yes	BL thigh pouch
26	66	5	230	No	R thigh pouch, STSG
27	55	5	445	No	R. orchiectomy, left thigh pouch, STSG
28	58	5	510	No	BL thigh pouch, STSG
29	67	5	365	No	BL thigh pouch, STSG
30	66	6	*	No	BL thigh pouch, STSG
31	30	12	395	No	BL thigh pouch, STSG
32	40	5	55	No	R. thigh pouch, STSG

Table 1: Patients' Surgical Procedures and Outcome.

Demographics	
Median BMI (IQR)	30.7 (5.3) kg/m^2
Median Age (IQR)	58 (16.5) year
Median Number of Procedures (IQR)	5 (2.25)
Median Length of Stay (IQR)	22.5 (17) days
Fournier's Specific Mortality	4/32 (12.5%)

Table 2: Patients Demographics**.**





Unilateral Orchiectomy	12.50%	(4/32)
Bilateral Orchiectomy	3.10%	(1/32)
Split Thickness Skin Graft (STSG)	69.00%	(22/32)
Split Thickness Skin Graft (Scrotal Reconstruction)	32.30%	(10/32)
Unilateral Thigh Pouch	9.40%	(3/32)
Bilateral Thigh Pouch	21.80%	(7/32)
Unilateral Primary Scrotal Closure	3.10%	(1/32)
Bilateral Primary Scrotal Closure	9.40%	(3/32)

Table 3: Surgical Management.

Thigh pouch reconstruction was performed in 10 out of 32 patients (Table 3), not only as a temporary modality to preserve the exposed testicle, but also to facilitate wound care and reconstructive process of perineal tissue in these critically ill patients. In follow up, two patients died, while one patient was lost to follow up. From the seven remaining patients, two were living out of state. These two patients were contacted by telephone, reported no complaint from a testicular standpoint, and refused any further reconstruction attempt. Five patients (with nine testicles in thigh pouches) were followed with scrotal ultrasound in clinic. None of them reported any pain, discomfort or other complaints in different body positions or while ambulating. Two patients had minimal focal tenderness with palpation of testicles on physical exam. Scrotal US was performed anywhere from three months to two years after surgery. One of the nine testicles showed decrease in volume from 16.23 to 11.88 ml. There was no noted abnormality in size of the other eight remaining testicles. All patients with thigh pouches were offered repositioning of testicles to a natural location with reconstructive surgery. All of these patients refused additional surgical intervention. No patient reported any complaints associated with the placement of the testicles in the anteromedial thigh pouch. There was12.5 percent mortality rate due to Fournier's gangrene. Mean length of hospital stay at our center was 22.5 days (Table 2).

Discussion

We observed a variety of comorbid conditions associated with Fournier's gangrene including but not limited to diabetes mellitus, obesity, hypertension, COPD, prostate cancer, and chronic renal failure. In our patient population, diabetes mellitus found in 65.6% of the patients, substantially higher than an average of 37% reported in a large national study of 1,680 patients [7]. 53.1% of our patients had hypertension compared to a reported average of 31% [7]. In addition, a higher obesity rate of approximately 58% relative to a reported average rate of about 11% [7] detected. Jeong, et al. [8] reported 15% rate of chronic renal failure in a series of 40 patients, which is similar to our observed rate of 12.5%. Of our patient population, 21.9% had COPD [9]. This rate is much higher than the average rates of 7.5% and 15.2% reported in literature [4,5]. Primary or secondary wound closure is an ideal reconstruction method following extensive perineal debridement; however, based on patient comorbidities, team experience, and extent of exposed tissue, often this is not an attainable goal. The surgical reconstructive technique employed depends on the extent of tissue damage, the anatomy of the patient's perineum, the patient's baseline general medical condition and surgeon's preference. Chen, et al. [10] described a reconstructive strategy wherein patients with minor defects receive delayed primary closure while patients with moderately severe defects involving the scrotal area (<50% involvement) receive a scrotal advancement flap and patients with more severe defects (>50% involvement of scrotal area) undergo creation of pudendal thigh flaps. Additionally, patients with deep tissue damage receive a gracilis muscle flap, and patients with large areas of involvement, especially those patients exhibiting abdominal wall involvement, receive split-thickness skin grafts. Spyropoulou, et al. [11] also demonstrated reconstruction of perineoscrotal lesions secondary to Fournier's gangrene with pedicled anterolateral thigh flaps.

We used negative pressure wound therapy applied by wound VAC® (vacuum-assisted closure), in different stages of surgical reconstruction for patients with FG in order to facilitate graft health and healing. We noted substantial benefits with use of VAC®. Moreover, other surgeons have reported that use of negative pressure wound therapy during treatment reduced patient discomfort and negative outcomes [12,13]. In patients with extensive scrotal loss, if primary closure cannot be achieved following surgical debridement of necrotic tissue, management of the exposed testes becomes a significant concern. Thigh pouches allows delayed primary closure in patients with extensive (>50%) loss of scrotal skin [14]. Our data indicates that change in testicle size and patient discomfort following relocation of the testes from the diseased scrotum to the anteromedial thigh pouch was minimal. We furthermore experienced a case wherein following extensive debridement, the testicle was not managed immediately. Later on extra mobility of testicle resulted in testicular torsion, and finally orchiectomy was necessary. Relocation of testicles into thigh pouches rather than reconstruction of the scrotum with skin grafting in selected cases of Fournier's gangrene with significant scrotal involvement potentially offers a variety of advantages to the patient. This technique avoids the risks of additional surgical procedures. A significant proportion of this patient population suffer from a variety of comorbidities, which may negatively influence surgical outcomes. It also offers protection of the testicles from infection and torsion that may occur if the testes sit outside the scrotum awaiting further surgical reconstruction.

Thigh pouch surgery decrease the overall number of surgeries and the cost for patient management. Finally, the thigh pouch technique can be performed by a trained urologist and does not need involvement of plastic surgery team for grafting. The involvement of a sole surgical subspecialty would be particularly advantageous in rural areas and in developing countries where highly trained specialty services may not be readily available. We believe that our experience supports the use of thigh pouch as a permanent reconstructive strategy in patients who have severe comorbidities or those who prefer not to undergo future extensive reconstructive procedures involving stepwise and multi-stage surgical procedures with higher treatment costs. We acknowledge both local and split-thickness skin grafts serve as excellent reconstructive strategies for many patients; however, we believe that in higher-risk patients with significant surgical comorbidities and in institutions lacking highly specialized surgical and medical services, relocation of the testes to the thigh pouch is a viable long-term reconstructive

option. There are multiple limitations to our study. First of all, we acknowledge the small number of our patients and incomplete data on tissue excision. Our data lacks uniform follow-up for clinic visits and ultrasound or CT imaging in patients undergoing thigh pouch reconstruction. Further studies with longer follow up are necessary to confirm our primary

Conclusion

Repositioning of testicles into thigh pouches following surgical debridement in patients with Fournier's gangrene in addition to offering short-term advantages and facilitating wound management and healing, may be considered as an acceptable long-term surgical solution, especially in patients with poor baseline medical condition. Regular follow-up with ultrasonography and possibly serial serum testosterone measurements is indicated in younger patients with a better general health condition, if they choose thigh pouch as a long-term option.

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