



Genitalia Gangrene Secondary to High Inotropic Support: A Case Report

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Abstract

We present a rare case report of a gentleman on high dose noradrenaline and vasopressin developing genitalia gangrene.

This is a 54 year old gentleman with pT4N0M1a Recto-sigmoid Cancer and bladder extension post high Anterior Resection with partial cystectomy three years prior. He developed intra-abdominal sepsis with shock and was transferred to the intensive care unit with dual high dose inotropes and developed distal bilateral upper limb gangrene. He was noted on day 6 of inotropic support to have dry penile-scrotal gangrene with scrotal edema.

Surgical debridement was discussed but family declined in view of the overall poor prognosis and was thus conservatively managed. The gangrene remained dry and demarcated to the superficial skin layer with sloughing on day 16 of inotropic support.

This suggests a need for vigilance and detailed examination including the genitalia in patients on high dose inotropes. However, it is still a very rare complication.

Keywords: Infection; Bladder cancer; Inotropes

Abbreviations

ICU: Intensive Care Unit; IV: Intravenous; mcg/kg/min: Micrograms Per Kilogram Per Minute

Introduction

Peripheral limb gangrene is a known complication of high dose inotropic support [1,2] with pathophysiology due to vasoconstriction of distal end vessels resulting in tissue necrosis. This has been reported as a catastrophic complication in the Intensive Care Unit (ICU). However case reports of genitalia gangrene in this setting are very rare. We present a rare case report of a patient on high dose noradrenaline and vasopressin, with complications of upper limb distal hypo-perfusion developing penile-scrotal gangrene.

Case Presentation

Patient background

This is a 54 year old Chinese gentleman with pT4N0M1a Recto-sigmoid Cancer with bladder extension post high Anterior Resection and partial cystectomy, complicated by a persistent pelvic collection needing a Hartmann's operation. He has no other co-morbidities. During the second year of surveillance, he was found to have colorectal adenocarcinoma recurrence in the bladder and underwent a Trans-Urethral Resection of Bladder Tumour with subsequent chemotherapy and radiotherapy.

Clinical history

He presented with fecaluria for 3 days to the outpatient clinic two and a half years after his initial surgery, and was admitted inpatient. He reported fecal material in the urinary stream associated with abdominal pain. He was afebrile and with normal blood pressure. Initial physical examination revealed the abdomen to be soft and non-tender, renal punch negative bilaterally, and the existing ileostomy healthy. Grossly feculent urine was noted.

The patient was kept nil by mouth with a naso-gastric tube inserted and placed on low intermittent suction, with initiation of intravenous (IV) metronidazole and ceftriaxone. An indwelling urinary catheter was inserted. A computed tomography scan of the abdomen and pelvis was suggestive of an enterovesical fistula which was also seen during flexible cystoscopy. Subsequently he developed edema.

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Figure 1: Day 6 of inotropic support: Genitalia dry gangrene involving the entire penis, left hemi-scrotum and portion of the right hemi-scrotum.



Figure 2: Day 13 of inotropic support. Scrotal gangrene demarcation with sloughing of superficial skin layer.

Bilateral percutaneous nephrostomies were inserted for urinary diversion; and he was managed with nil by mouth and total parenteral nutrition with a plan for bowel resection and possible hartmanns reversal after optimising nutrition.

Unfortunately he developed septic shock secondary to intra-abdominal sepsis on day 17 of admission. The next day, he was transferred to the ICU and noradrenaline support was started at 0.4 mcg/kg/min.

Blood cultures grew *Klebsiella pneumoniae* and yeast, with antibiotics escalated to IV meropenem, amikacin, vancomycin and fluconazole. His blood pressure improved and noradrenaline was weaned down to 0.28 mcg/kg/min on ICU day 2. A joint decision was made with the colorectal service and ICU team for exploratory laparotomy, adhesiolysis and resection of the entero-vesical fistula.

Post operatively on ICU day 4, he had worsening hypotension despite being on noradrenaline 1 mcg/kg/min. Vasopressin was started at 2.4 units/hour with attempts at weaning down noradrenaline. He underwent a second exploratory laparotomy to rule out ischemic bowel which returned negative. The patient had multiple episodes of hypotension and persistent sepsis needing dual high dose inotropes. On ICU day 5 vasopressin was weaned off with noradrenaline at 0.58 mcg/kg/min.

He was noted on day 6 of the ICU admission and inotropic support during routine physical examination to have new findings of distal bilateral upper limb duskiness. On further examination there was genitalia gangrene which was dry, involving the entire penis and majority of the scrotum with concurrent scrotal edema. Extent of involvement included the entire penis up to the base, the entire left hemi-scrotum and a portion of the right hemi-scrotum.



Figure 3: Day 13 of inotropic support. Bilateral upper limb dry gangrene in distal digits with no progression.



Figure 4: Day 16 of inotropic support. Scrotal gangrene with sloughing of the superficial layer and healthy skin underneath. Concurrent left upper limb digital ischemia which remained dry.

Noradrenaline was at 0.48 mcg/kg/min at that time. This was a clinical diagnosis, with physical examination showing no evidence of wet gangrene, pus formation, underlying abscess nor weepy skin (Figure 1).

Clinical progress

Options for management of the dry scrotal gangrene were considered, including surgical debridement or conservative management and wound care with a view of proceeding to surgical debridement if gangrene progressed to wet gangrene. These options were discussed, but the family declined surgical debridement in view of the background of multi-organ dysfunction and the likely overall poor prognosis. This was thus conservatively managed with daily dressing change, normal saline cleansing and close monitoring. Physical examination was done at least twice a day to screen for progression.

Extent of care was explored in view of the overall poor prognosis and multi-organ failure. The patient's wife and family wished for non-escalation of inotropes and not for cardio-pulmonary resuscitation as per what the patient wanted.

The gangrene remained dry, stable and did not increase in extent. It started to demarcate to the superficial layer of the scrotum with sloughing on ICU day 13. Noradrenaline was weaned down to 0.3 mcg/kg/min but not further (Figure 2). The upper limb distal gangrene remained dry and demarcated. There was progressive sloughing of the superficial layer of the scrotum with healthy tissue seen below on ICU day 16 (Figure 3). Noradrenaline was continued on 0.3 mcg/kg/min (Figure 4).

Comfort care was maintained with inability to wean down noradrenaline and the patient became progressively hypotensive despite fluid challenges. The patient subsequently unfortunately passed on due to intra-abdominal sepsis on ICU day 20.

Discussion and Literature Review

A Pubmed search using the key words “scrotum”, “gangrene”, “inotropes”, “noradrenaline”, “vasopressin” did not reveal any reported cases of scrotal gangrene associated with inotropic use.

A variety of associations with scrotal gangrene have been reported, with vasectomy, perianal abscess, circumcisions and inguinal hernia repairs [1-4] usually reported predominantly in the scrotum and not the penis. Genitalia gangrene associated with vasculitis has been reported, but only in the setting of hypersensitivity vasculitis and buerger's disease [5,6].

The patient in our report lacked risk factors for peripheral vascular disease and did not have diabetes mellitus, human immunodeficiency virus infection, nor was a chronic alcoholic [7]. The likely pathophysiology in this patient would be obliterative endarteritis of the subcutaneous arteries contributed by vasoconstriction from high dose inotropes. Noradrenaline as an alpha-receptor stimulator is used frequently in patients with septic shock and its vasospastic effect on end arteries can cause decreased perfusion causing distal ischemia. This is supported by the gangrene distribution involving several end arteries with known good blood supply: the scrotum by the external pudendal and perineal artery, and penis from the superficial perineal artery and internal pudendal artery [8]. This supports the pathophysiology of a general vasospastic effect on several end arteries. However we acknowledge that the background of septic shock, hypotension and multi-organ dysfunction had also likely contributed with decreased peripheral perfusion, and compounded by vasoconstriction from inotropes.

Our patient was on a high dose of noradrenaline up to 1 mcg/kg/min, with a total duration of 6 days, and the lowest dose at 0.3 mcg/kg/min prior to the development of peripheral gangrene. This definition is consistent with other intensive care studies where high dose inotrope was defined as receipt at any point of ≥ 1 mcg/kg/min of norepinephrine equivalent [9]. The high doses of inotropic support in our patient was also similar to another case report of four limb peripheral gangrene where noradrenaline was up to 0.5 mcg/kg/min [10,11]. Our patient also had concurrent peripheral limb gangrene, supporting the aetiology of end artery ischemia.

Our diagnosis of dry penile-scrotal gangrene is a clinical one, based on physical examination. Differentials would include wet gangrene, underlying abscess or rapidly progressing Fournier's gangrene. Our examination revealed that the gangrene was dry, and noting importantly neither underlying boggy nor pus within the underlying subcutaneous layers in the penile shaft and the scrotum, excluding wet gangrene and underlying abscess. In view of this, further imaging with ultrasound was not necessary. Close monitoring was instituted to ensure no further extension of the gangrene boundaries to exclude a rapidly progressing Fournier's gangrene.

In terms of management of genitalia gangrene, options included surgical debridement or conservative management. Deciding factors to be considered include the gangrene being dry and not wet in nature, extent of the gangrene and also the overall prognosis of the patient. The risks of surgical debridement include further hypotension with general anaesthesia in a patient who is septic, and procedural risks

including bleeding and injury to underlying structures. Merits of early surgical debridement would include early control and preventing further development into wet gangrene or subsequent secondary infection which may lead to Fournier's gangrene. The merits of a conservative approach would be avoidance of general anaesthesia and further hypotension, with close observation to allow early decision to abandon conservative management and opt for surgical debridement if the gangrene progressed or with evidence of secondary infection. Our patient had dry gangrene which was much localised to the penis and scrotum, allowing the option of a conservative approach. The gangrene also subsequently demarcated and remained dry, with the superficial layer sloughing off, revealing healthy skin underneath. In addition, in view of the overall poor prognosis of the patient and in line with the family and patient's wishes, the conservative approach was appropriate with overall goals of care.

Conclusion

Despite genitalia gangrene being rare in a setting of high inotropic use, this case report suggests a need for vigilance and detailed examination including the genitalia in patients on high dose inotropes with septic shock. Surgical debridement may need to be considered early if there are signs of wet gangrene or rapid extension. A multidisciplinary approach involving nursing staff will be crucial in early detection and treatment.

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