

Neglected Constrictive Ring Injury Leading to Thumb Gangrene, Myiasis and Polymicrobial Infection in a Patient with Schizophrenia: A Case Report

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Abstract

Background: Constrictive ring injuries of the digits are uncommon but potentially devastating conditions that may lead to progressive vascular compromise, digital ischaemia, tissue necrosis, and amputation if diagnosis and treatment are delayed. Advanced presentations may be further complicated by secondary polymicrobial infection and myiasis, particularly in vulnerable patients with impaired insight and self-neglect. Individuals with severe psychiatric disorders are especially susceptible to delayed presentation, resulting in increased morbidity and poorer functional outcomes.

Case Presentation: We report the case of a 32-year-old woman with chronic schizophrenia who presented with a neglected constrictive ring injury involving the left thumb. Owing to delayed presentation and refusal to remove the constricting ring, the injury progressed to irreversible digital ischaemia and gangrene, complicated by wound myiasis and polymicrobial soft tissue infection. Clinical examination demonstrated extensive tissue necrosis distal to the constriction, associated with foul-smelling purulent discharge and visible maggot infestation. Laboratory investigations revealed inflammatory markers consistent with acute infection CRP was 31, while radiographs showed no evidence of osteomyelitis. Following multidisciplinary assessment, the patient underwent urgent surgical management consisting of first metacarpophalangeal joint disarticulation, serial surgical debridement, culture-directed antimicrobial therapy, and delayed wound closure. Microbiological cultures demonstrated polymicrobial infection, including *Morganella morganii*. The postoperative course was uncomplicated, and satisfactory wound healing was achieved after two weeks of antibiotics following the last surgery.

Conclusion: This case highlights the severe consequences of neglected constrictive ring injuries, particularly in patients with severe psychiatric illness. The coexistence of digital gangrene, myiasis, and polymicrobial infection involving *Morganella morganii* represents an exceptionally uncommon presentation. Early recognition, prompt surgical intervention, appropriate antimicrobial therapy, and multidisciplinary management including psychiatric care are essential to minimise morbidity and optimise clinical outcomes.

Keywords: Constrictive ring injury; Thumb gangrene; Myiasis; *Morganella morganii*; Schizophrenia; Polymicrobial infection

Introduction

Constrictive ring injuries, also referred to as digital tourniquet injuries, are uncommon but potentially limb threatening conditions resulting from prolonged circumferential compression of a digit. Continuous constriction impairs lymphatic drainage and venous return, leading initially to progressive oedema. As tissue swelling increases, arterial inflow becomes compromised, resulting in digital ischaemia, tissue necrosis, and, in advanced cases, irreversible gangrene requiring amputation if timely intervention is not undertaken. Delayed diagnosis remains the principal determinant of poor clinical outcome and is associated with substantially increased rates of tissue loss and permanent disability [1,2].

Neglected constrictive ring injuries may be further complicated by secondary bacterial infection, particularly when prolonged tissue ischaemia produces devitalised tissue that serves as an ideal environment for microbial proliferation. These infections are frequently polymicrobial, involving both aerobic and anaerobic organisms, and may progress rapidly to extensive soft tissue destruction if left untreated [3,4]. Although *Morganella morganii* is a recognised opportunistic Gram-negative pathogen, it is an uncommon cause of hand infections and is more frequently encountered in polymicrobial infections affecting debilitated or immunocompromised individuals. Its isolation in advanced soft tissue infections generally reflects extensive tissue necrosis and prolonged wound contamination [5]. Another unusual complication of neglected digital injuries is wound myiasis, defined as infestation of living tissue by fly larvae. Myiasis has become rare in modern clinical practice and is generally associated with prolonged wound neglect, poor hygiene, social deprivation, or impaired self-care. When present, it usually indicates advanced local tissue destruction and frequently coexists with severe secondary bacterial infection [3].

Patients with severe psychiatric disorders, particularly schizophrenia, represent a population at increased risk for delayed presentation. Impaired insight, reduced judgment, self-neglect, diminished pain perception, and poor health-seeking behaviour may prevent timely recognition of progressive digital injury, allowing otherwise preventable pathology to advance to irreversible stages before medical attention is sought. Consequently, these patients experience disproportionately high rates of infection, tissue loss, and amputation [6].

To our knowledge, reports describing the simultaneous occurrence of constrictive ring-induced thumb gangrene, wound myiasis, and polymicrobial infection involving *Morganella morganii* in a patient with schizophrenia are exceedingly rare. This case highlights the devastating consequences of delayed presentation, emphasises the importance of early recognition and multidisciplinary management, and reviews the relevant literature regarding this uncommon but clinically significant presentation.

Case Presentation

A 32-year-old woman with a known diagnosis of schizophrenia presented to the emergency department with severe pain, progressive swelling, foul-smelling discharge, and black discoloration of the left thumb. According to her family, she had been wearing a tight metallic ring at the base of the thumb for an unknown duration. Despite progressive worsening of the injury, she repeatedly refused to remove the ring or seek medical attention because of poor insight into her illness related to her underlying psychiatric disorder. There was no documented history of diabetes mellitus, peripheral vascular disease, immunodeficiency, or recent trauma to the affected hand.

On presentation, the patient was haemodynamically stable with no clinical evidence of systemic sepsis. Her vital signs were as follows: temperature 36.5 °C, heart rate 78 beats/min, blood pressure 127/67 mmHg, respiratory rate 20 breaths/min, and Oxygen saturation 98% on room air.

Examination of the affected thumb revealed a deeply embedded metallic ring circumferentially constricting the base of the digit. The entire thumb distal to the metacarpophalangeal (MCP) joint was swollen and associated with extensive black necrosis, consistent with established gangrene and foul-smelling purulent discharge. Numerous live maggots were identified within the wound, confirming wound myiasis (Figure 1 a and b). Capillary refill distal to the constriction was absent, and no distal sensation or active movement could be elicited, indicating irreversible neurovascular compromise. There was no clinical evidence of proximal spread of infection or necrotising fasciitis.

Laboratory investigations demonstrated an acute inflammatory response with a white blood cell count of $6.8 \times 10^9/L$ ($2.4-9.5 \times 10^9/L$), neutrophils $3.5 \times 10^9/L$ ($1.0-4.8 \times 10^9/L$), monocytes $0.6 \times 10^9/L$ ($0.2-0.5 \times 10^9/L$) C-reactive protein 31mg/L, and haemoglobin 11 g/dL. renal function, liver function tests, and serum glucose were normal. Blood cultures were not obtained.

Plain radiographs of the thumb demonstrated marked soft tissue swelling surrounding the constricting ring with no evidence of osteomyelitis, fracture, soft tissue gas, or cortical destruction (Figure 1-c).



Figure 1 (A): Shows the visible maggot infestation (myiasis) within the wound, **(B):** the wound after initial debridement and **(C):** the X-ray shows no evidence of osteomyelitis.

Following multidisciplinary assessment involving orthopaedic surgery, plastic surgery, psychiatry, and infectious disease specialists, the patient was taken urgently to the operating theatre. Under regional anaesthesia, the constricting metallic ring was carefully removed, and extensive wound exploration was performed. Intraoperatively, complete necrosis of the distal thumb with non-viable skin, subcutaneous tissue, and soft tissue structures was identified. Because tissue viability could not be preserved, first MCP joint disarticulation was performed. A viable volar soft tissue flap was preserved to facilitate subsequent reconstruction and wound closure. Thorough irrigation and aggressive surgical debridement of all devitalised tissue were undertaken, and the wound was intentionally left open to permit serial reassessment and further debridement.

Multiple deep tissue specimens were obtained for microbiological culture and antimicrobial susceptibility testing before administration of antibiotics. Empirical intravenous broad-spectrum antimicrobial therapy consisting of Co-Amoxiclav 1.2 gm IV TID was commenced immediately after surgery.

Microbiological cultures after first debridement surgery demonstrated polymicrobial infection including *Morganella morganii*, *Candida parapsilosis*, *Proteus mirabilis*, *Enterococcus faecalis* along with *Lactobacillus curvatus* and *Corynebacterium* species. Antimicrobial susceptibility testing demonstrated that both *Proteus mirabilis* and *Morganella morganii* were sensitive to Ciprofloxacin, Gentamicin and Trimethoprim/Sulfamethoxazole. *Proteus mirabilis* was sensitive to Ampicillin and Cefuroxime while *Morganella morganii* was resistant, the latter was sensitive to Ceftriaxone. *Enterococcus faecalis* was sensitive to Ampicillin. Microbiological cultures after the last debridement surgery subsequently demonstrated *Pseudomonas aeruginosa*. Antimicrobial susceptibility testing demonstrated sensitivity to Amikacin, Ceftazidime, Ciprofloxacin, Cefepime and Piperacillin/Tazobactam following which antibiotic therapy was modified to oral Co-Amoxiclav 1gm BID and oral Ciprofloxacin 500mg BID in accordance with infectious disease recommendations. Intravenous antibiotics were continued for seven days, followed by oral therapy for seven days, giving a total treatment duration of 14 days.

The patient underwent two additional surgical debridement procedures (at day 3 and day 7) until a healthy, well-vascularised wound bed was achieved. Delayed primary wound closure was successfully performed on day 7 (during the last debridement surgery) after complete control of infection and clear demarcation of viable soft tissue (Table 1). The postoperative course was uncomplicated, with progressive wound healing and no evidence of recurrent infection.

The patient was discharged on day 9 following completion of inpatient treatment. At two weeks follow-up, the surgical wound had healed uneventfully without recurrent infection or wound breakdown. She subsequently underwent psychiatric review with optimisation of her antipsychotic therapy and received counselling regarding hand care and compliance with future medical follow-up. At the final review, she had returned to her daily activities and remained satisfied with the clinical outcome.

Table 1: Clinical Timeline & Management.

Timeframe	Clinical Presentation & Diagnostic Findings	Interventions & Management
Day 1 (Presentation)	Neglected constrictive ring injury of the left thumb. • Extensive thumb gangrene. • Foul-smelling purulent discharge with wound myiasis. • Severe neurovascular compromise. • Plain X-rays: No osteomyelitis or cortical destruction).	Multidisciplinary assessment performed. • Metallic ring removed. • Left thumb MCP joint disarticulation performed. • Extensive irrigation and debridement. • Deep tissue cultures obtained. • Wound left open.
Day 3	No discharge but still unhealthy soft tissue.	2nd debridement performed to clear residual devitalized tissue.
Day 7	Healthy, well-vascularized wound bed.	3rd debridement and delayed primary wound closure performed.
Day 9	Patient clinically stable for transition to outpatient care	Patient discharged with oral antimicrobial therapy.
2 Weeks follow-up	Wound completely healed without recurrent infection or breakdown. Patient resumed usual daily activities.	Psychiatric follow-up and optimization of antipsychotic treatment.

Discussion

Constrictive ring-related injuries are uncommon but well-recognised causes of progressive digital vascular compromise. Prolonged circumferential compression initially impairs lymphatic drainage and venous return, resulting in progressive oedema.

Continued swelling may subsequently compromise arterial inflow, leading to digital ischaemia, tissue necrosis, and, in advanced cases, irreversible gangrene requiring amputation [7,8]. Early recognition and removal of the constricting object are therefore essential to prevent progression to irreversible tissue loss.

The present case illustrates the severe consequences of delayed presentation, with three major complications occurring simultaneously: extensive ring-induced ischaemic necrosis, wound myiasis, and polymicrobial infection in a patient with Schizophrenia. The prolonged duration of constriction was unknown, but the patient's repeated refusal to remove the ring and delayed presentation allowed the injury to progress to irreversible tissue necrosis.

Psychiatric illness may contribute substantially to delayed presentation in patients with physical injuries. Patients with schizophrenia may experience impaired insight, impaired judgment, reduced self-care, and altered health-seeking behaviour, potentially resulting in delayed recognition of serious medical conditions [9]. This highlights the importance of considering mental health, insight, and decision-making capacity when managing patients with potentially serious physical injuries.

Another notable feature of this case was wound myiasis. Myiasis refers to infestation of living tissue by fly larvae and is uncommon in modern clinical practice. It is generally associated with neglected wounds, poor hygiene, social vulnerability, and impaired self-care. Although digital myiasis has rarely been reported, previous cases have described its association with extensive tissue destruction, infection, and, in severe cases, amputation [10]. In the present case, the presence of numerous larvae within a gangrenous and infected thumb can be regarded as an indicator of prolonged wound neglect and advanced local tissue destruction.

The extensive tissue necrosis and wound contamination also provided a favourable environment for polymicrobial infection. Deep tissue cultures in this patient demonstrated multiple organisms, including *Morganella morganii*, *Proteus mirabilis*, *Enterococcus faecalis*, *Candida parapsilosis*, *Lactobacillus curvatus*, and *Corynebacterium* species, while *Pseudomonas aeruginosa* was subsequently isolated following the final debridement. These findings support the importance of obtaining deep tissue specimens during surgical debridement in severely contaminated and neglected wounds, allowing antimicrobial therapy to be subsequently tailored according to microbiological findings and susceptibility testing [4]. The isolation of *Morganella morganii* is of particular interest. *M. morganii* is a Gram-negative opportunistic pathogen that can cause skin and soft-tissue infections, particularly in patients with underlying risk factors and extensive tissue compromise [5]. Its presence in this case occurred in the context of extensive necrosis, prolonged wound contamination, and polymicrobial infection. Although it is difficult to attribute the severity of the infection to a single organism in a polymicrobial wound, its isolation further demonstrates the complex microbiological environment associated with prolonged tissue necrosis and wound neglect [10].

Management of neglected constrictive ring injuries should be prompt and multidisciplinary. The first priority is urgent removal of the constricting object to eliminate the ongoing mechanical cause of vascular compromise [8]. When irreversible necrosis has already developed, surgical removal of non-viable tissue is necessary. Serial debridement and repeated assessment of tissue viability may be required in contaminated wounds before definitive closure [4,11]. In this patient, the extent of distal thumb necrosis necessitated first MCP joint disarticulation, while preservation of viable volar soft tissue allowed subsequent wound closure. Microbiological sampling before antimicrobial administration is particularly valuable in severe or contaminated infections. Initial empirical antimicrobial therapy should subsequently be refined according to culture and susceptibility results, in collaboration with infectious disease specialists. Delayed primary closure can also be considered once adequate debridement has been achieved, infection is controlled, and a healthy vascularised wound bed is present.

This case also emphasises that management should extend beyond the surgical treatment of the physical injury. Psychiatric assessment and optimisation of treatment were important components of the patient's care because the underlying psychiatric illness contributed to the delayed presentation and refusal of early treatment. Future prevention therefore requires attention to both the physical wound and the factors responsible for delayed healthcare engagement.

Conclusions

Neglected constrictive ring injuries are rare but potentially devastating conditions that may result in irreversible digital necrosis, severe infection, and amputation when diagnosis and treatment are delayed. This case demonstrates the complex consequences of delayed presentation in a patient with schizophrenia, including thumb gangrene, wound myiasis, and polymicrobial infection involving *Morganella morganii*. Early recognition, urgent removal of the constricting object, aggressive surgical management, appropriate culture-directed antimicrobial therapy, and multidisciplinary care are essential to achieve infection control and optimise outcomes. Particular attention should be given to patients with psychiatric disorders, as impaired insight and self-neglect may significantly contribute to delayed presentation and disease progression.

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