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Chronic Post-Traumatic Ischemic Gangrene of the Right Index Finger after Delayed Presentation following Blunt Bovine Trauma: A Case Report from a Resource-Limited Setting

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ABSTRACT

Background: Chronic ischemic gangrene of a finger developing months to years after blunt trauma is uncommon because of the extensive collateral circulation of the hand. Delayed presentation may complicate diagnosis and management, particularly in resource-limited settings.

Case Presentation: A 43-year-old male agriculturist from the Adamawa Region of Cameroon presented two years after sustaining blunt trauma to his right hand from a bovine animal. During this period, he received treatment exclusively from a traditional practitioner, reportedly involving cutaneous scarifications, herbal applications, and tight splinting. Clinical examination revealed mummification of the middle and distal phalanges of the right index finger, with a clear line of demarcation and localized junctional discharge. Brachial, radial, and ulnar pulses were palpable. Plain radiographs demonstrated chronic destructive bony and articular changes, while colour duplex ultrasonography revealed patent forearm and palmar arteries but no detectable blood flow in the affected finger's digital arteries. Histopathology, microbiological culture, and cross-sectional angiography were unavailable or unaffordable.

Management and Outcome: A clinical and radiological diagnosis of chronic post-traumatic dry gangrene with presumed secondary osteomyelitis was established. Metacarpophalangeal disarticulation was performed. Postoperative recovery was uneventful, and the patient subsequently returned to agricultural work.

Conclusion: This case highlights the consequences of prolonged delays in seeking definitive medical care following hand trauma and the diagnostic challenges encountered in resource-limited settings. Early clinical assessment, appropriate vascular evaluation, and timely surgical management are important considerations in preventing advanced complications.

Keywords: *Ischemic gangrene; Hand; Finger; Blunt trauma; Delayed presentation; Resource-limited setting; Traditional medicine; Case report.*

INTRODUCTION

Gangrene of the upper extremity is seen less often than gangrene of the lower limb, which is usually attributed to the rich collateral network of the hand, in which the radial and ulnar arteries converge into the superficial and deep palmar arches [1–3]. When upper-limb ischemia occurs, it is most commonly associated with acute thromboembolism, penetrating or crush injury, iatrogenic catheter trauma, vasculitis or advanced systemic vascular disease [4,5]. Chronic gangrene appearing insidiously over months to years after blunt trauma is reported only rarely [6,7].

Blunt extremity trauma can damage an artery without interrupting flow at the time of injury; intimal disruption, dissection or a contained haematoma may remain clinically silent and later serve as a focus for thrombosis [7,8]. This sequence is a plausible explanation for delayed digital ischemia, but in an individual patient who presents years later the original arterial lesion is seldom demonstrated directly.

In rural sub-Saharan Africa, injured people often first consult traditional practitioners because of proximity, cost and cultural familiarity, and formal surgical care may be reached only after long delay [9,10]. We report a patient in whom a finger injury progressed to dry gangrene over two years without formal care. Our aims are to describe what was actually observed, to separate documented findings from inferred mechanisms, and to discuss the diagnostic and surgical decisions made with the limited resources available. The report follows the CARE case-report framework [14].

CASE PRESENTATION

Patient Information and History

A 43-year-old right-hand-dominant male agriculturist, married with two dependent children and living in a rural part of the Adamawa Region of Cameroon, presented to the surgical department of Ngaoundéré Lutheran Norwegian Hospital with progressive blackening, shrinkage, chronic pain and loss of function of the right index finger. He reported no diabetes, hypertension, peripheral vascular disease, thromboembolism or sickle-cell disease, and no tobacco, alcohol or illicit drug use; he had had no previous surgery. These elements are based on history alone, as no vasculitic or hypercoagulability testing was available.

Approximately two years before admission, a cow struck his right hand while he was herding livestock. He described immediate pain, bruising and swelling. Because of geographic isolation, cost and cultural preference, he did not attend a formal health facility and instead consulted a local traditional practitioner. According to the patient's account, over roughly the next 18 months this practitioner made repeated cutaneous scarifications, applied herbal pastes and placed a tight circumferential wooden splint. The finger became progressively cold, pale, numb and painful, and developed a flexion deformity. During the six months before admission the middle and distal phalanges became black, dry and shrivelled. Two weeks before presentation the skin broke down at the demarcation line with a foul-smelling discharge. A single intramuscular injection of diclofenac (75 mg) at a rural dispensary gave no relief, and he was referred to our hospital. The specific contributions of the scarifications, herbal applications and splinting to the ischemia cannot be separated from the underlying injury and are not independently verified; they are reported here as the patient described them.

CLINICAL FINDINGS

The patient was thin and appeared dehydrated and tired, with pale conjunctivae, but he was afebrile and haemodynamically stable: blood pressure 120/75 mmHg, pulse 78 beats/min, respiratory rate 18 breaths/min, oxygen saturation 98% on room air. Systemic examination was unremarkable, and the lower limbs were warm with strong, symmetrical pulses.

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Local findings of the right upper limb were confined to the index finger:

- Dry, black, shrivelled tissue involving the middle and distal phalanges of the right index finger, with a clear line of demarcation at the level of the proximal interphalangeal joint.
- A cold, anaesthetic digit with no capillary refill, no turgor and no active or passive movement.
- Focal tenderness and a small amount of malodorous seropurulent discharge at the junctional zone, without proximal lymphangitis or axillary lymphadenopathy.
- Bounding brachial, radial and ulnar pulses at the elbow and wrist, with no detectable digital pulsation in the affected finger; the contralateral hand was neurovascularly intact.

DIAGNOSTIC ASSESSMENT

Laboratory and imaging findings

The full blood count report gave a white cell count of 6.06×10^9/L (differential: neutrophils 58.6%, lymphocytes 27.2%, mixed/"MID" fraction 14.2%), red cell count 3.78×10^{12}/L, haemoglobin 14.1 g/dL, haematocrit 35.7%, mean corpuscular haemoglobin concentration 39.5 g/dL, red-cell distribution width 19.0% and platelets 315×10^9/L. The red-cell values are internally discordant (a low red-cell count and haematocrit with a normal haemoglobin and a high MCHC) and do not fit a standard anaemia pattern; we therefore did not label the patient as anaemic on the basis of this report, and we have not assigned a pathophysiological meaning to the isolated MID or MCHC abnormalities. Platelets and total white count were normal. Fasting glucose (88 mg/dL), creatinine (0.9 mg/dL) and blood urea nitrogen (14 mg/dL) were within reference ranges, and HIV-1/2 and hepatitis B screening were non-reactive. ESR and CRP were not available.

Plain radiographs (posteroanterior and oblique) of the right hand showed chronic destructive change: diffuse joint-space narrowing involving the carpal, metacarpophalangeal and interphalangeal joints; subchondral erosions and osteopenia; carpal disorganization with early fibrous or bony ankylosis; and resorption with loss of definition of the distal phalangeal tuft of the index finger.

Colour duplex ultrasound showed patent brachial, radial and ulnar arteries with triphasic waveforms continuing into the palmar arches, with no detectable arterial lumen or Doppler signal in the proper digital arteries of the right index finger. These are the findings in this patient; they localise the perfusion defect to the digital vessels but do not define the underlying arterial lesion.

No histopathological examination, no microbiological culture and no CT or catheter angiography were performed: these services were not available locally and the patient could not afford referral or out-of-pocket costs. Surgical decisions were therefore based on the clinical picture, plain radiographs and duplex ultrasound.

DIFFERENTIAL DIAGNOSIS

The presentation was considered against the following alternatives. No vasculitic, thrombophilic or cross-sectional vascular studies were performed, so these conditions were not formally investigated or definitively excluded; they were judged less likely on clinical grounds.

1. Chronic post-traumatic ischemic gangrene. Post-traumatic digital ischemia progressing to dry gangrene. Considered most consistent with the clear temporal relationship to a documented blunt injury, single-digit involvement, patent forearm vessels and absence of systemic vascular features. The exact arterial lesion and its timing were not demonstrated.
2. Diabetic microvascular gangrene. Considered less likely given the normal fasting glucose and no history or other stigmata of diabetes; formal diabetic assessment was not done.
3. Thromboangiitis obliterans (Buerger's disease). Considered less likely given the non-smoking history, single-digit involvement, normal pedal pulses and traumatic onset; it cannot be wholly excluded without vascular imaging.

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4. Autoimmune vasculitis. Considered less likely given the absence of systemic or rheumatological features and the isolated post-traumatic course; no autoimmune serology was available.
5. Secondary chronic osteomyelitis. Chronic osteomyelitis was thought likely on clinical and radiographic grounds (junctional discharge, chronicity, erosive and tuft changes) but was not confirmed by culture or histopathology; it was regarded as a presumptive, secondary complication of the necrotic digit rather than the primary process [15,16].

WORKING DIAGNOSIS

Chronic dry gangrene of the right index finger, extending to the proximal interphalangeal level, in a patient seen two years after blunt bovine trauma and managed in the interval by a traditional practitioner; with presumed (clinically and radiologically diagnosed, not microbiologically or histologically confirmed) secondary low-grade osteomyelitis. A post-traumatic digital arterial occlusion is the most plausible mechanism but was not directly demonstrated.

THERAPEUTIC INTERVENTION

The patient was admitted and given intravenous crystalloid, analgesia (paracetamol and tramadol) and nutritional support. Because discharge was present and no culture service was available, empirical broad-spectrum antibiotics were started (ceftriaxone 1 g every 12 hours and metronidazole 500 mg every 8 hours), continued intravenously for 120 hours and then stepped down to oral cefixime plus metronidazole for five days.

Revascularization was not pursued. By the time of assessment, the affected digit had been mummified for approximately six months, and the ischemic process had evolved over two years; the tissue was frankly necrotic and non-viable, with no distal arterial target detectable on ultrasound. In that situation restoration of inflow was considered unlikely to salvage any meaningful tissue, and the local service had no facility for microvascular reconstruction or angiographic mapping. The decision was therefore made to proceed to ablation of the non-viable digit rather than to attempt revascularization [5,11,12].

Disarticulation was carried out at the metacarpophalangeal (MCP) joint rather than at a more distal level for several reasons. First, the demarcation line lay at the proximal interphalangeal joint and the proximal phalanx and surrounding soft tissues showed chronic change, so a more distal amputation risked leaving non-viable or infected tissue and a wound that would not heal. Second, disarticulation at the MCP joint allowed all diseased tissue to be removed through healthy, well-perfused flaps. Third, removing the entire index ray segment preserved a painless, durable hand with intact thumb and preserved thumb-to-middle/ring opposition and grip, which mattered most for the patient's agricultural work. After counselling and written informed consent, the right index finger was disarticulated at the MCP joint under axillary block with tourniquet control (250 mmHg). Operative findings were thrombosed digital neurovascular bundles and necrotic flexor and extensor tendons. The metacarpal head cartilage was contoured, non-viable tissue was debrided, and the wound was irrigated with 3 litres of saline. Dorsal and palmar fasciocutaneous flaps were closed loosely over a passive silicone drain with interrupted 3-0 nylon. No tissue was sent for histopathology or culture because these services were unavailable and unaffordable.

FOLLOW-UP AND OUTCOME

Recovery was uneventful and the chronic pain resolved immediately after surgery. The drain was removed on the second postoperative day. The wound healed by primary intention with healthy flap margins and no ascending infection, and the patient was discharged on the fourth postoperative day. At review at two weeks, six weeks and three months the stump was fully epithelialized, the scar was sound, and the patient had preserved thumb-to-digit opposition and satisfactory grip; he had returned to farming. No recurrent infection or stump complication was reported.

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Patient Perspective

The patient speaks Fulfulde. The following is a translated and condensed account of what he told the treating team, rather than a word-for-word quotation; it was translated by a team member fluent in Fulfulde and reviewed with him to confirm that it faithfully reflected his experience:

"When the cow injured my hand two years ago, I did not think I could lose a finger. In my village we go first to the traditional healer; that is what everyone knows. As the months went by the pain did not stop, and when the finger became black I was very frightened. I am thankful that the pain is gone and that I can still use my hand to work. If a hand injury does not improve, people should go to the hospital early."

DISCUSSION

This patient's course is unusual: a single finger progressed to dry gangrene over two years after blunt trauma, while the forearm and palmar circulation remained patent. In this discussion we distinguish what we observed from what we infer, and we avoid generalising beyond a single case.

What the case does and does not show

The documented facts are the two-year history after a blunt injury, the mummified digit with a demarcation line and localized discharge, patent radial and ulnar pulses with triphasic waveforms, absent digital-artery Doppler signal in the affected finger, and chronic destructive changes on radiography. What was not demonstrated is the nature of the original arterial lesion. A reasonable proposed sequence is that blunt force caused an intimal injury that remained patent initially (explaining why the hand appeared viable at first), with later thrombosis of the digital vessels and failure of local collateral inflow leading to dry necrosis [7,8]. Tight circumferential splinting, reported by the patient, could plausibly have contributed by external compression, and the scarifications and herbal applications may have contributed to the superficial infection. These mechanisms are consistent with the history but were not measured or imaged in this patient, and they are presented as possibilities rather than established findings [8,13].

Bone and joint changes, and the limits of diagnosing osteomyelitis

The radiographs showed long-standing destructive change (joint-space loss, erosions, osteopenia, tuft resorption, early ankylosis) that is compatible with chronic ischemic osteoarthropathy and with secondary osteomyelitis. Plain radiographs are an accessible first-line study but are neither sensitive nor specific early and cannot on their own distinguish infection from chronic ischemia [15,16]. The accepted reference standard for osteomyelitis is histopathology and bone culture [16]. Neither could be obtained here, and no MRI or inflammatory markers were available. We therefore regard osteomyelitis as a clinical and radiological presumption, not a confirmed diagnosis; the empirical antibiotics were given on that basis.

Imaging in a resource-limited setting

CT angiography and catheter angiography define arterial injury and guide revascularization in well-resourced services [5,11], but neither was available or affordable here. In this patient duplex ultrasound answered the specific question that determined management — whether the proximal arteries were patent and whether the digit had any detectable inflow — and it did so non-invasively and at low cost. We do not suggest that ultrasound replaces CTA or angiography in vascular trauma generally: it is operator-dependent, does not map the full arterial tree, and would not suffice for planning revascularization. Its value in this case was in confirming proximal patency and absent digital perfusion in a patient whose only realistic option was ablative surgery [5,11,13].

Why MCP disarticulation was chosen

In acute limb or digit ischemia, timely revascularization can salvage tissue [5,12]; in established dry gangrene the necrotic tissue is irrecoverable and treatment shifts to removing non-viable tissue, controlling infection and preserving function [12,13]. For this patient the amputation level was set at the MCP joint because tissue at and beyond the proximal interphalangeal level was non-viable or chronically involved, because healthy perfused flaps were available at the MCP level for reliable closure, and because this preserved a painless hand with the thumb and remaining fingers

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capable of opposition and grip for manual labour. The good functional outcome at three months supported that choice in this individual, without implying it is the correct level in every patient.

Delayed care and traditional treatment

The two-year delay was the central factor in this outcome. The patient's own account was that cost, distance and familiarity led him to a traditional practitioner, as is common in rural Cameroon and elsewhere in the region [9,10]. Traditional bone setters and healers are often the first point of care and can provide accessible support; problems arise when injuries that need formal assessment are not recognised or referred [10]. In this case the tight splint, scarifications and herbal applications were reported by the patient and may have aggravated the injury, but we cannot separate their effect from that of the original trauma, and we make no generalisation about traditional practitioners or communities. Our experience with this patient suggests value in local arrangements that help patients with worsening post-traumatic pain, coldness or colour change reach formal care sooner; we offer this as an observation, not as evidence for a particular programme.

Lessons from this case

Point-of-care duplex ultrasound may be considered in district hospitals to evaluate vascular patency when advanced imaging is unavailable. Duplex ultrasound provided clinically useful information regarding proximal arterial patency and detectable digital perfusion, which contributed to the management decision in this patient."

CONCLUSION

A 43-year-old agriculturist presented with dry gangrene of the right index finger two years after blunt bovine trauma, having received only traditional care in the interval. Patent forearm arteries with absent digital perfusion on ultrasound, together with chronic radiographic bone destruction, supported a diagnosis of chronic post-traumatic ischemic gangrene with presumed secondary osteomyelitis; the underlying arterial lesion and the osteomyelitis were not confirmed because angiography, histopathology and culture were neither available nor affordable. Metacarpophalangeal disarticulation relieved his pain and preserved a functional hand for farm work. The case documents both the consequences of delayed presentation and the diagnostic constraints of a resource-limited environment.

Patient Consent Statement

Written informed consent was obtained from the patient for publication of this case report and accompanying clinical details and images. A copy of the consent is available for review by the Editor-in-Chief. All identifying information has been anonymised. The patient perspective was obtained in Fulfulde, translated by a fluent member of the clinical team, and confirmed with the patient as an accurate account of his experience.

Ethical Approval

Formal ethical review was waived in accordance with the policies of Ngaoundéré Lutheran Norwegian Hospital and Kesmonds International University for a single-patient, retrospective case report involving anonymised data and standard clinical care.

Conflict of Interest

The authors declare no competing interests.

Artificial Intelligence Use Declaration

AI-assisted tools were used solely for limited language editing and formatting of the authors' own draft. The authors personally conceived the report, verified every clinical fact and laboratory value against the patient record, made all diagnostic and surgical decisions, and take full responsibility for the clinical interpretation, the restrained claims made in the text, and the final manuscript. AI tools were not used to generate clinical data, to invent mechanisms or diagnoses, or to prepare figures.

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Data Availability
The de-identified clinical data supporting this report are available from the corresponding author on reasonable request, subject to confidentiality constraints.

Authors' Contributions
Peter Mattew George conceived and designed the report, collected and verified the clinical data, performed the surgery and follow-up, and drafted the manuscript. Arda Isik supervised the work, contributed to interpretation, and critically revised the manuscript. Both authors approved the final version and agreed to be accountable for all aspects of the work.

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TABLES AND FIGURES

Table 1. Chronological timeline of clinical events.

Timepoint	Event / intervention	Status and findings
24 months before admission (injury)	Blunt bovine trauma to right dominant hand; immediate pain, swelling, bruising	No formal medical care sought
Months 1–18 after injury	Care by traditional practitioner: scarifications, herbal pastes, tight splint (as reported by patient)	Progressive coldness, pallor, numbness, pain, flexion deformity
Months 18–23 after injury	Progressive mummification of the finger	Dry gangrene of middle and distal phalanges
2 weeks before admission	Skin breakdown at demarcation line; foul discharge	Presumed secondary superficial infection
1 day before admission	Rural dispensary; single IM diclofenac 75 mg	No relief; referred to our District Referral Hospital
Hospital day 1 (admission)	IV fluids, empirical IV ceftriaxone + metronidazole, analgesia; radiographs and duplex ultrasound	Patent forearm/palmar arteries; no digital arterial flow; non-viable digit
Hospital day 2 (postoperative day 0)	Counselling and consent; right index MCP disarticulation under axillary block	Thrombosed digital vessels and necrotic tendons found; closure over drain
Hospital day 3 (postoperative day 1)	Inpatient monitoring; IV antibiotics; wound inspection	Stable; pain relieved; healthy flaps
Hospital day 4 (postoperative day 2)	Wound inspection; passive silicone drain removed	Minimal drainage; no haematoma or ascending infection
Hospital day 6 (postoperative day 4)	Step-down to oral cefixime + metronidazole; discharge	Clean, healing stump; outpatient follow-up arranged
2 weeks, 6 weeks, 3 months	Outpatient wound review and hand rehabilitation	Complete epithelialization; preserved grip; returned to farm work

Table 2. Laboratory investigations at presentation, with reference intervals.

Parameter	Result	Reference range (adult male)	Interpretation in this patient
White blood cell count	6.06 × 10^9/L	4.0–10.0 × 10^9/L	Within reference range
Neutrophils	58.6%	45–70%	Within reference range
Lymphocytes	27.2%	20–40%	Within reference range
Mixed (“MID”) fraction	14.2%	3.0–10.0% (analyser-dependent)	Slightly above range; not interpreted in isolation (no ESR/CRP available)

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Red blood cell count	3.78 × 10^{12}/L	4.50–5.90 × 10^{12}/L	Below range; discordant with Hb (see below)
Haemoglobin	14.1 g/dL	13.5–17.5 g/dL	Within reference range
Haematocrit	35.7%	40–50%	Below range; discordant with Hb
MCHC	39.5 g/dL	32.0–36.0 g/dL	Above range; no specific mechanism assigned (possible specimen/analyser effect)
RDW	19.0%	11.5–14.5%	Elevated; indicates red-cell size variation
Platelet count	315 × 10^{9}/L	150–450 × 10^{9}/L	Within reference range
Fasting blood glucose	88 mg/dL	70–100 mg/dL	Within reference range
Serum creatinine	0.9 mg/dL	0.7–1.3 mg/dL	Within reference range
Blood urea nitrogen	14 mg/dL	7–20 mg/dL	Within reference range
HIV-1/2 screening	Non-reactive	Non-reactive	Non-reactive
Hepatitis B surface antigen	Non-reactive	Non-reactive	Non-reactive

Note on red-cell indices: the low red-cell count and haematocrit together with a normal haemoglobin and elevated MCHC are internally inconsistent and likely reflect, at least in part, analyser or specimen variation in the local laboratory. The values are reported as received; the authors deliberately did not diagnose "anemia of chronic disease" or attribute the isolated MCHC/RDW changes to a specific mechanism, since the data do not support a single interpretation.

Figure Legends

Figure 1. Clinical presentation of the right hand at admission. Dorsal view showing established dry gangrene (mummification) of the middle and distal phalanges of the right index finger, with a line of demarcation at the proximal interphalangeal joint level, skin shrivelling and localized junctional discharge, without proximal cellulitis.



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Figure 2. Plain radiographs of the right hand (posteroanterior and oblique views). Diffuse joint-space narrowing, subchondral erosions, osteopenia and resorption of the distal phalangeal tuft of the index finger, with carpal disorganization. These chronic changes are compatible with ischemic osteoarthropathy and possible secondary osteomyelitis; the latter was not confirmed by culture or histopathology.



Figure 3. Colour duplex ultrasound of the right upper limb. Patent radial and ulnar arteries with triphasic waveforms extending to the palmar arches, with absence of Doppler flow signal in the proper digital arteries supplying the right index finger.

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