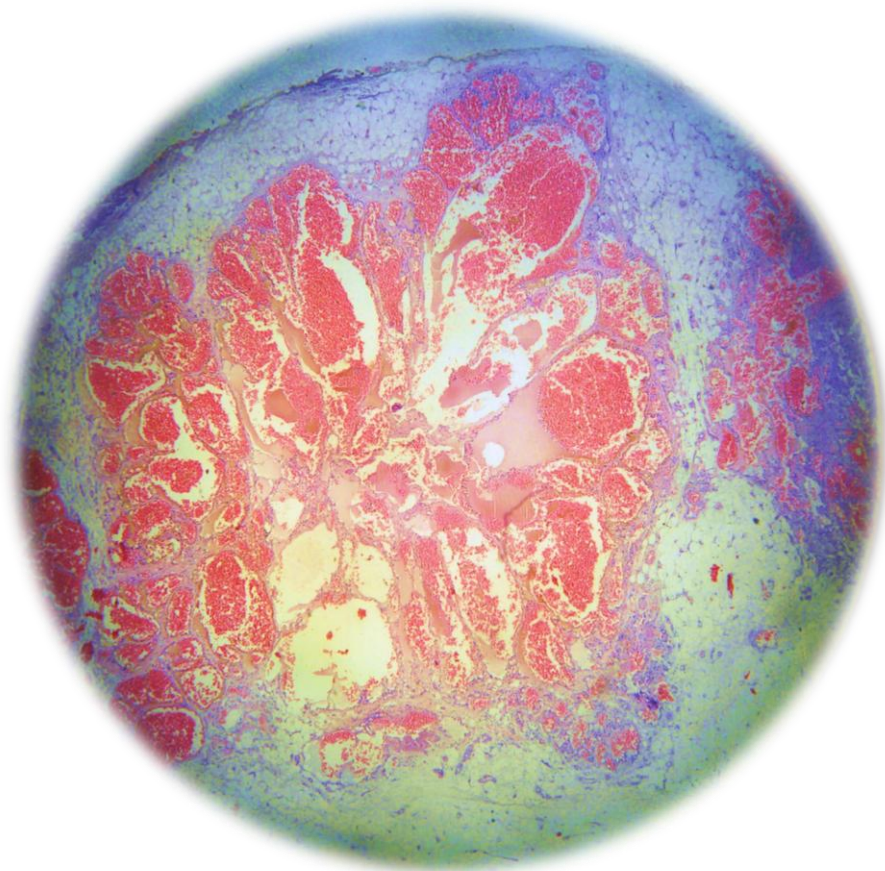




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## Case Report

# Surgery as a Management Option for Post-Chikungunya Chronic Synovitis Presenting as a Dorsal Wrist Mass

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### Abstract

**Introduction:** Chikungunya fever is a mosquito-borne viral illness that commonly causes acute febrile disease followed by persistent musculoskeletal manifestations. Localised mass-like synovial lesions of the wrist following Chikungunya infection are rarely reported.

**Case presentation:** We report a 40-year-old female who developed a progressively enlarging dorsal wrist mass following serologically confirmed Chikungunya infection. Despite conservative treatment, she developed significant functional limitations. Imaging demonstrated inflammatory synovitis and extensor tenosynovitis. Surgical excision was performed, and histopathology confirmed chronic inflammatory synovitis.

**Discussion:** Post-Chikungunya chronic synovitis is thought to result from persistent immune-mediated inflammation. While medical management remains first-line, surgery may be indicated in selected cases with Localised disease and functional impairment.

**Conclusion:** This case highlights surgery as a valuable management option for Localised post-Chikungunya chronic synovitis presenting as a dorsal wrist mass.

**Keywords:** Chikungunya; Chronic synovitis; Wrist mass; Tenosynovitis; Surgery

### 1. Introduction

Chikungunya virus infection is Characterised by acute fever, polyarthralgia, and myalgia. Although most patients recover completely, a substantial proportion develop chronic inflammatory

musculoskeletal manifestations such as arthritis, tenosynovitis, and synovitis. These chronic sequelae can persist for months or years and significantly affect quality of life. Localised mass-forming synovitis of the hand and wrist following Chikungunya infection is uncommon and may pose a diagnostic challenge. We present a rare case of post-Chikungunya chronic synovitis presenting as a dorsal wrist mass requiring surgical management.

### 2. Case Presentation

A 40-year-old female presented with a progressively enlarging lump over the dorsal aspect of her right hand and wrist. She had a documented history of Chikungunya fever, confirmed on 1st June by ELISA IgM positivity. The acute illness was Characterised by one week of high-grade fever followed by post-viral arthralgia and myalgia involving both upper and lower limb joints.

A few weeks after the Febrile episode, she noticed a Localised swelling over the dorsum of the right hand, which gradually increased in size. There was no history of trauma, local infection, or previous similar swellings. The swelling was associated with pain and significant functional limitation, particularly during finger extension, most notably involving the middle finger, despite treatment with non-steroidal anti-inflammatory drugs, corticosteroids, and other conservative measures.

Clinical examination revealed a soft to firm, non-fluctuant mass measuring approximately  $5.4 \times 3$  cm over the dorsal aspect of the right wrist and hand. The overlying skin was normal with no erythema or warmth. Wrist movements were mildly restricted due to pain, and no neurovascular deficits were detected.

Ultrasonography of the right hand demonstrated moderate subcutaneous edema over the dorsal aspect with mild fluid accumulation surrounding the extensor tendons, particularly involving the middle finger. Increased synovial vascularity was noted, consistent with active inflammatory synovitis and mild extensor tenosynovitis. No Localised collections, abscesses, or discrete mass lesions were identified.

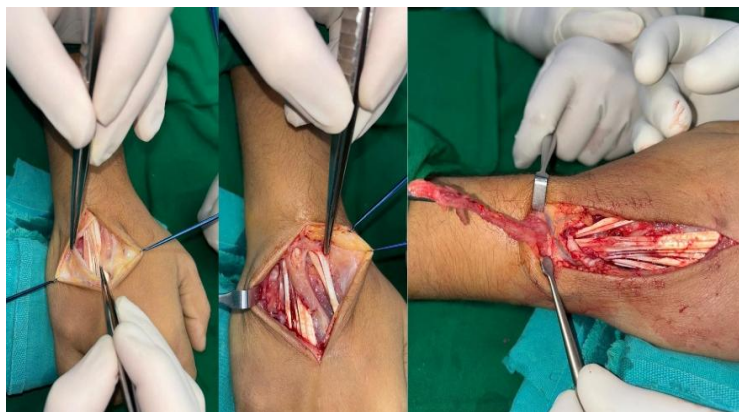


*Figure 1: Pre Operative appearance of the lump*

Given the progressive symptoms and functional impairment, surgical exploration and excision were planned. Under general Anaesthesia and with the use of a pneumatic tourniquet to achieve an avascular field, a longitudinal dorsal incision was made. Careful dissection revealed a firm, capsulated mass with proximal extension beneath the extensor retinaculum up to the distal forearm, incorporating the extensor tendons distally. Complete excision was performed with meticulous dissection, and the specimen was sent for histopathological examination. The wound was closed using absorbable monofilament subcuticular sutures.

Histopathological examination revealed synovial tissue with hyperplasia, dense chronic inflammatory infiltrate, vascular proliferation, and mild perivascular chronic inflammation with lymphoid follicle formation. There was no evidence of suppuration, granuloma formation, myxoid degeneration, or neoplasia. These findings supported a diagnosis of chronic inflammatory synovitis.

Based on clinical history, imaging findings, and histopathology, a diagnosis of post-Chikungunya chronic synovitis of the right wrist was established.



*Figure 2: Intraoperative appearance of the lump*

## Discussion

Chikungunya virus infection is well recognized for its chronic

rheumatological sequelae, with persistent arthralgia, arthritis, tenosynovitis, and synovitis occurring in up to 30–60% of patients, particularly middle-aged women. The underlying pathogenesis is believed to involve viral persistence and immune-mediated inflammatory responses within synovial tissues.

Histopathological features such as synovial hyperplasia, lymphocytic infiltration, vascular proliferation, and lymphoid follicle formation have been described in post-Chikungunya chronic synovitis and closely resemble inflammatory arthropathies such as rheumatoid arthritis. Localised mass-like presentations are rare and may mimic ganglion cysts, neoplastic lesions, or infective processes.

While medical management remains the cornerstone of treatment, surgical intervention is indicated in selected cases with diagnostic uncertainty, failure of conservative therapy, or significant functional impairment due to Localised synovial hypertrophy or tendon involvement. In the present case, progressive restriction of finger extension and extensive extensor tendon involvement necessitated surgical excision, which provided both diagnostic confirmation and symptomatic relief.

## Conclusion

Post-Chikungunya chronic synovitis can rarely present as a Localised dorsal wrist mass causing significant functional limitation. In such cases, surgical excision serves as both a diagnostic and therapeutic modality. Clinicians in endemic regions should consider post-Chikungunya inflammatory pathology in the differential diagnosis of wrist and hand masses.

## Patient Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

## Ethical Approval

Formal ethical approval was not required for this case report in accordance with institutional policy.

## Funding

No funding was received for this study.

## Conflict of Interest

The authors declare no conflicts of interest

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## Case Report

## Management of 80% Flame Burns Following a Petrol Explosion in an Infant

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### Abstract

Severe flame burns in infants represent one of the most challenging emergencies in pediatric surgery. The extensive surface area involved, combined with physiological vulnerability, demands rapid, coordinated, and multidisciplinary care. We report the case of a one-year and two-month-old boy who sustained 80% total body surface area (TBSA) burns following a domestic petrol explosion. Through timely fluid resuscitation, meticulous wound care, early surgical intervention, and comprehensive postoperative rehabilitation, the child achieved a favorable recovery. This case illustrates the crucial role of early excision and grafting, supported by intensive multidisciplinary management, in improving survival and functional outcomes in extensive pediatric burns. Keywords: Pediatric burns, Flame injury, Split-thickness skin graft, Burn management, Rehabilitation

### Introduction

Burn injuries remain a major global health concern, particularly in the pediatric population where even minor incidents can lead to catastrophic outcomes. Infants are especially vulnerable due to their thin skin, higher body surface area-to-weight ratio, and limited physiological reserves. Large surface area burns, particularly those exceeding 70% TBSA, carry a grave prognosis. However, advancements in critical care, fluid resuscitation, surgical management, and nutritional support have significantly improved survival rates over the last few decades (Herndon et al., 2023).

Here, we present the case of a one-year and two-month-old boy who sustained extensive flame burns involving 80% of his body surface area following a petrol explosion at home. The child's survival and recovery underscore the importance of early resuscitation, timely surgical intervention, and structured rehabilitation in managing large pediatric burns.

### Case Presentation

A one-year and two-month-old previously healthy male was brought to the emergency department approximately one hour after sustaining extensive flame burns during a domestic petrol explosion. On arrival, the child was in severe pain and distress, tachycardic with a heart rate of 180 beats per minute, hypotensive (70/40 mmHg), and clinically in burn shock. Roughly 80% of the total body surface area was affected, including the trunk, abdomen, perineum, and both lower limbs. The burns were deep second- and third-degree injuries, with areas of eschar formation, but there was no clinical or radiological evidence of inhalation injury.

The child was immediately transferred to the Burns Intensive Care Unit (ICU) for stabilization. The working diagnosis was 80% TBSA flame burns secondary to petrol explosion.

### Initial Management

Resuscitation was initiated promptly according to the Modified Parkland Formula using Ringer's lactate solution, closely monitoring urine output to guide fluid replacement. Supplemental 5% dextrose was infused to prevent hypoglycemia, and strict input-output balance was maintained. Analgesia was provided with intravenous paracetamol and low-dose morphine, while a proton pump inhibitor was administered for gastric protection. Intravenous Cefazidime was started for infection prophylaxis.

Nutritional support was established early through a nasogastric tube, providing a high-protein, calorie-dense formula tailored to the child's metabolic needs. Daily electrolyte and acid-base monitoring guided ongoing care. By the tenth day, hemodynamic stability had been achieved, with progressive improvement in perfusion and urine output. Wound care consisted of daily saline cleansing and topical silver sulfadiazine application.

Despite the extent of burns, renal function remained stable, and metabolic acidosis resolved by day twelve, marking the transition from acute resuscitation to a recovery phase in the ICU.

## Surgical Management

By the fourth week post-injury, the child's condition was stable enough to proceed with surgical management. Under general anesthesia, wide burn wound excision was performed over the abdomen and both lower limbs, extending down to healthy tissue planes. Within five days, definitive coverage was achieved with split-thickness skin grafts harvested from unaffected areas, including the upper thighs and back.

The grafts were meshed in a 1:1.5 ratio and applied over the excised surfaces. They were secured with fine staples and dressed with paraffin gauze and absorbent layers. Donor sites were covered with hydrocolloid dressings to promote epithelialization. The postoperative course was uneventful; the grafts remained healthy with approximately 90% take by the seventh postoperative week, and no infection or fluid imbalance was observed.

## Postoperative Course

The child's pain was well controlled, and his nutrition was gradually transitioned from enteral to oral feeding. Intensive physiotherapy was introduced in the eighth week, focusing on limb movement and contracture prevention. By day sixty, complete graft healing was achieved, and donor sites had fully re-epithelialized.

Early hypertrophic scars began to develop over the abdomen and limbs. Scar management was initiated using silicone gel Bio-Oil, and Mometasone cream. Pressure garments were introduced for long-term scar modulation, and oral antihistamines were prescribed to control itching. Splints were applied to maintain limb extension, particularly around the knees and ankles, to prevent flexion contractures.

Throughout the recovery phase, physiotherapists worked closely with caregivers to ensure compliance with exercises and positioning, which contributed greatly to the functional outcome.

## Outcome and Follow-Up

After seventy-two days of hospitalization, the child was discharged in a stable condition. All grafted areas were healthy, hemoglobin was 11.5 g/dL, and nutritional parameters were satisfactory. The family was educated on scar care, daily application of silicone-based products, and the use of pressure garments. Physiotherapy and stretching exercises were to be continued at home, with follow-up visits scheduled every two weeks.

At the three-month review, the child was thriving. The grafts were stable, scars had softened, and there was no evidence of limb contracture or functional restriction. The multidisciplinary team approach had successfully restored both form and function.

## Discussion

Major pediatric burns continue to pose significant treatment challenges. Children with burns covering more than 70% TBSA face high risks of hypovolemic shock, infection, and metabolic derangement. Successful outcomes depend largely on timely fluid resuscitation, early surgical intervention, and meticulous postoperative care (Jeschke et al., 2008).

In the present case, adherence to the Parkland formula ensured adequate fluid replacement and perfusion. Early wound excision and grafting shortened the inflammatory phase and improved recovery time (Atiyeh et al., 2005). Furthermore, scar modulation with silicone gels, pressure therapy, and regular physiotherapy minimized hypertrophic scarring, a common complication in growing children (Brusselaers et al., 2020).

The success of this case underscores the value of a coordinated multidisciplinary approach, involving surgeons, anesthetists, nutritionists, physiotherapists, and nursing staff. Emotional and psychological support to the family was equally vital in facilitating adherence to care and ensuring the child's long-term recovery.

## Conclusion

This case demonstrates that even in infants with extensive 80% TBSA burns, survival and meaningful recovery are possible with early intervention and cohesive multidisciplinary management. Prompt resuscitation, early excision and grafting, infection control, and long-term rehabilitation together contribute to improved survival and functional outcomes in severe pediatric burns.

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## Case Report

## Management of a Brachial Plexus Neurofibroma by Piecemeal Resection

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### Abstract

Brachial plexus tumors are rare and may arise from intrinsic neural elements or adjacent compressive structures. Neurofibromas, benign peripheral nerve sheath tumors, often involve nerve fascicles, making excision challenging with risk of neurological deficit. We report a 46-year-old female with a 5-year history of a progressively enlarging right supraclavicular mass and ulnar sensory impairment. Imaging revealed a well-defined mass related to subclavian vessels. Surgical exploration identified origin from the C8 root with C7 tethering. Piecemeal excision preserved neural structures. Histology confirmed neurofibroma (S100, NSE positive). Sensory improvement was noted at 3 months. Careful planning is essential for optimal outcomes.

**Keywords:** Brachial plexus, Neurofibroma, Piecemeal resection

### Introduction

Tumors involving the Brachial plexus are uncommon and may arise from either intrinsic neural elements or from extrinsic lesions compressing the plexus. Neurogenic tumors in this region are frequently associated with Neurofibromatosis type 1 (NF-1). Neurofibromas are benign, heterogeneous tumors originating from the connective tissue of peripheral nerve sheaths[1]. In contrast to Schwannoma, which typically displaces adjacent neural structures, neurofibromas tend to involve the nerve fascicles intimately, making surgical excision more challenging and increasing the risk of neurological deficit[2].

The role of pre-therapeutic biopsy in suspected benign nerve sheath tumors remains limited. The diagnostic sensitivity is moderate, and the procedure carries potential risks, including damage to intact nerve fascicles and hemorrhage[2]. Accurate pre-operative differentiation between schwannoma and neurofibroma is therefore crucial, as it

significantly influences surgical planning and the expected functional outcome following tumor excision[3].

We report a rare case of a solitary neurofibroma arising from the brachial plexus in the absence of NF-1, which was managed with surgical resection.

### Case presentation

We present the case of a 46-year-old female with a 5-year history of a right supraclavicular lump associated with sensory impairment in the right upper limb, predominantly along the ulnar nerve distribution, without any motor deficit. Both the size of the lump and the associated symptoms had gradually progressed over time. There was no history of trauma and no constitutional symptoms suggestive of tuberculosis or lymphoma.

Clinical examination revealed a well-defined, firm supraclavicular mass with reduced mobility. Sensory impairment was noted in the ulnar nerve distribution, without evidence of intrinsic muscle atrophy of the hand. Clinically no evidence of peripheral stigmata of Neurofibromatosis. Routine blood investigations were within normal limits, and chest radiography showed no apical lesion

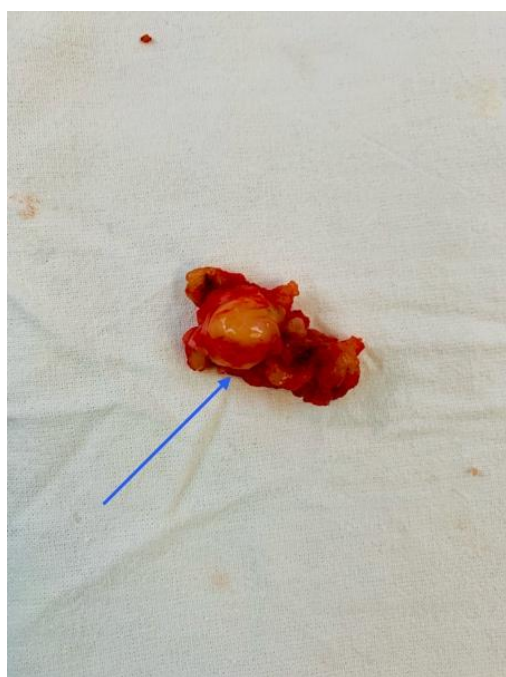


*Fig1- Right side Supraclavicular region, well defined solid lump( red arrow)*

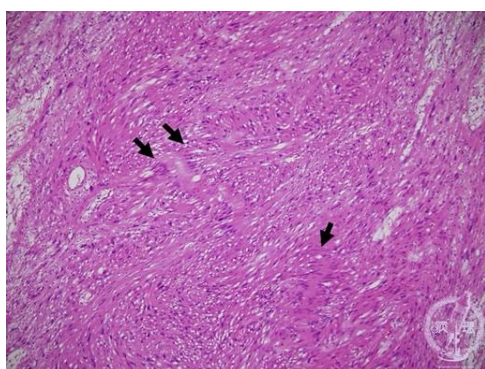
spindle-shaped mass in the right supraclavicular region measuring  $3.0 \times 3.7 \times 4.8$  cm. The lesion was closely related to the subclavian vessels without evidence of significant compression or mass effect on adjacent structures.

The patient was planned for surgical excision under general anesthesia. A supraclavicular incision was made, and the lesion was identified intraoperatively. The tumor was found to arise from the C8 nerve root and was tethered to the C7 nerve root. The accessory nerve and supraclavicular nerve bundle were carefully identified and preserved. Due to the complex anatomical location of the tumor, excision was performed in a piecemeal manner, leaving a small residual portion of the tumor in situ.

Postoperatively, the patient developed a hematoma, which was managed conservatively. She was subsequently discharged with a physiotherapy plan. At the 3-month follow-up assessment, the wound had healed well, and improvement in sensory symptoms was noted.



*Fig 2- Piece meal excision specimen of brachial plexus neurofibroma( blue arrow)*



*Fig 3- Histology showed a spindle cell lesion composed of long fascicles with focal whorling of cells*

Histopathological examination showed a spindle cell lesion composed of long fascicles with focal whorling of cells. The tumor cells exhibited elongated, pointed, wavy nuclei and moderate eosinophilic cytoplasm. Immunohistochemical staining demonstrated diffuse positivity for S100 and NSE. SMA and Desmin were negative in the spindle cells. The Ki-67 proliferative index was approximately 2–3%. No cellular atypia, increased mitotic activity, or necrosis was identified.

## Discussion

Peripheral nerve tumors constitute a heterogeneous group of predominantly benign neoplasms that are uncommon in the general population. They are broadly classified into two categories: peripheral nerve sheath tumors and non-nerve sheath tumors. Neurofibromas are characterized by a complex histological composition that includes Schwann cells, perineurial-like cells, and fibroblasts, interspersed with nerve fibers, wire-like collagen bundles, and a myxoid extracellular matrix<sup>[7]</sup>. The majority of neurofibromas are solitary lesions (up to 90%) and occur without an association with Neurofibromatosis type. Overall, neurofibromas account for approximately 5% of all benign soft-tissue tumors.<sup>[1,5]</sup>

Imaging modalities such as magnetic resonance (MR), computed tomography (CT), and positron emission tomography are valuable in the evaluation of peripheral nerve tumors. On CT imaging, schwannomas usually appear hypodense on non-contrast scans and moderately hyperdense following contrast administration, whereas neurofibromas are generally iso- to hypodense on both non-contrast and contrast-enhanced CT images<sup>[2]</sup>. Most primary tumors involving the brachial plexus require surgical management. Given that neurological deficits may worsen following surgical exploration, operative planning should be carefully guided by the presumed diagnosis and performed by an experienced surgeon.<sup>[2,5,6]</sup>

Benign tumors of the brachial plexus can be effectively managed with microsurgical techniques, with nerve grafting performed when necessary. In contrast, for malignant lesions, many authors advocate surgical resection with maximal preservation of brachial plexus function, followed by adjuvant radiotherapy and chemotherapy when indicated<sup>[3,4]</sup>.

In the present case, the patient presented predominantly with sensory symptoms without any associated motor deficit. Preoperative assessment and meticulous surgical planning are particularly critical due to the complex anatomical location of the brachial plexus. Preservation of the surrounding neurovascular structures, the extent of dissection, and the degree of residual tumor following resection significantly influence the overall outcome. Importantly, in such cases, patient satisfaction is often determined more by the improvement of clinical symptoms than by the extent of surgical resection alone.

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## Case Report

# Intraneural Venous Malformation of the Ulnar Nerve

## Abstract

Background: Intraneural venous malformations affecting peripheral nerves particularly the ulnar nerve is exceedingly rare and may present as compressive neuropathies. Proper clinical evaluation, diagnostic imaging and histopathology play key roles, and microsurgical resection is mainstay of treatment.

## Case presentation

A 20-year-old right-hand dominant female presented with right forearm cramps and intermittent numbness radiating to the hand for 3 months duration. 3 years back she has undergone surgical exploration of same region following imaging studies due to similar symptoms suspecting a vascular lesion. Previous surgical exploration has identified a clinically suspected venous malformation within and deep to the flexor tendons, for which debulking and decompression were performed and histology was confirmed as an arteriovenous malformation. After a three-year symptom free interval, similar but worsening symptoms gradually recurred. Ultrasound scan with doppler followed by MRI showed lesion recurrence of venous malformation abutting the ulnar neurovascular bundle. Re-exploration revealed an extensive intraneural venous malformation involving the ulnar nerve. Microsurgical debulking and decompression were performed, with complete excision confirmed on histology. The patient recovered well, with improved sensation and normal hand function.

## Conclusion

Intraneural venous malformations of the ulnar nerve, though rare, should be considered in the differential diagnosis of atypical neuropathic symptoms. Ultrasound with Doppler and MRI facilitates diagnosis and surgical planning, and microsurgical decompression with nerve preservation offers favorable outcomes.

## Keywords

Intraneural venous malformation; Ulnar nerve; Vascular malformation; Peripheral neuropathy; Microsurgery; MRI (magnetic resonance imaging); DSA (Digital Subtraction Angiography); Nerve conduction studies (NCS)

## Introduction

Venous malformations are congenital low-flow vascular anomalies that predominantly involve skin and soft tissues. Their intraneural occurrence, especially within peripheral nerves like the ulnar nerve, is extremely rare and diagnostically challenging. Only a limited number of cases have been reported in the literature. These lesions can mimic common entrapment neuropathies, leading to delays in diagnosis and treatment. Doppler ultrasound and MRI (Magnetic Resonance Imaging) serves as a critical imaging modality, while histopathology is definitive. Surgical decompression through microsurgical techniques remains the mainstay of management. This case report highlights the diagnostic and therapeutic journey of a recurrent intraneural venous malformation involving the ulnar nerve in a young patient.

## Case Presentation

A 20 year old right hand dominant schoolgirl, with no significant medical or allergy history, has been initially evaluated in year 2022 with clinical symptoms of right forearm cramps during writing, intermittent radiating forearm pain and numbness. There was no history known trauma or vascular symptoms. Examination revealed a soft, sub-centimeter, reducible lump on the volar aspect of the right wrist. The motor and sensory functions and distal vascularity were intact.

Following clinical evaluation imaging studies were done. Ultrasound scan with Doppler was suggestive of well-defined heterogeneously hypo echoic lesion (15 × 8 mm) deep to flexor tendons with internal vascularity. MRI Revealed abnormal tortuous vascular channels encircling the flexor digitorum superficialis (FDS) and profundus (FDP) tendons of right distal forearm. DSA (Digital Subtraction Angiography) was attempted but no abnormalities noted. Nerve conduction study (NCS) was also normal.

Exploration identified a venous malformation located within and beneath the FDS and FDP muscles. Debulking and carpal tunnel decompression were performed in year 2022. Histopathology confirmed an arteriovenous malformation. The patient remained symptoms free for three years.

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In year 2025 march, she sought medical attention due to re-experiencing similar symptoms for 3 months duration with worsening symptoms comparing to the past experience. Repeat nerve conduction study was also normal. Ultrasound with doppler was suggestive of residual or recurrence of previous malformation. MRI showed recurrent lesion of venous malformation in the flexor compartment of right forearm abutting the ulnar neurovascular bundle.

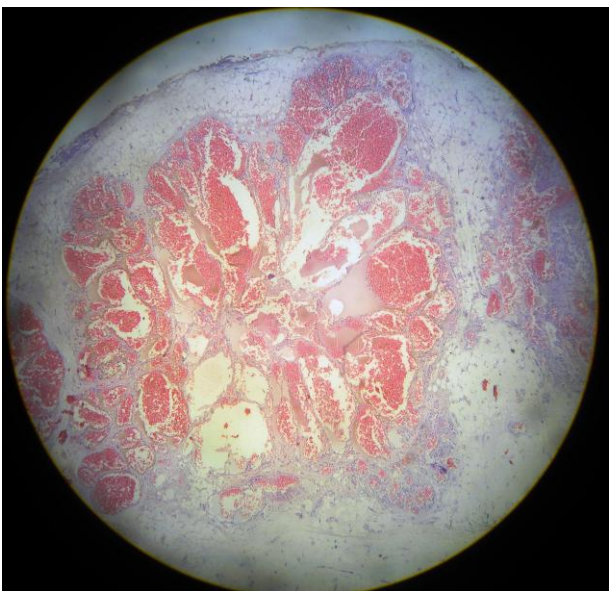


*Fig – 1 (Intraoperative finding of intraneural venous malformation)*



*Fig – 2 (Close look)*

Re-exploration was performed through a longitudinal incision along the ventromedial forearm, incorporating the previous scar in line with the ulnar nerve. Under magnification, the neurovascular lesion was carefully exposed, and an epineurotomy was performed to access the intraneural venous malformation. The lesion was meticulously dissected with controlled debulking while preserving neural integrity. Hemostasis was secured, and the specimen was sent for histopathological evaluation, which confirmed a venous malformation with complete excision. The postoperative course was uneventful and sensory symptoms improved, and she was subsequently followed up with occupational therapy and physiotherapy.



*Fig - 3 (Histological Appearance of the excised venous malformation)*



*Fig – 4 (after skin closure)*



*Fig – 5 (At the follow up visit)*

## Discussion

Venous malformation (VM) is the most common type of congenital vascular malformation (CVM) with an incidence of 1 to 2 in 10,000 and a prevalence of 1% [1]

Although present at birth, they are not always clinically evident until later in life and tend to grow in concert with the child and without spontaneous regression [2]

Venous malformations arising from the peripheral nerve are a rare type of vascular malformation [3] and this can cause compression neuropathies.

Venous malformation involving median nerve causing acute carpal tunnel syndrome has been reported [4]

Compression of the ulnar nerve is most commonly caused by ganglions, lipomas, anomalous tendon and muscles, trauma related to an occupation and arthritis in the upper limb; however, nerve compression in the upper limb and, more importantly, in the forearm by a vascular lesion is rare [5]

Doppler ultrasound (US) and magnetic resonance imaging (MRI) are key imaging methods used to characterize and diagnose venous malformations [6]

Duplex Ultrasound is a useful, non-invasive imaging technique and should be used as the first modality when investigating the presence of a vascular malformation, especially for superficial lesions or those in the extremities [7]

Magnetic resonance angiography (MRA) is useful in mapping the venous system and has supplanted the diagnostic role of conventional angiography in many cases [8] Angiography remains an adjunct imaging modality and important for cases requiring therapeutic intervention of venous malformations [6]

Treatment options include endoscopy assisted or open microsurgery, sclerotherapy and ablative techniques [6]

## Conclusion

This case underscores the rare and challenging nature of intraneural venous malformations affecting the ulnar nerve. MRI is invaluable in diagnosis and surgical planning, while histology confirms the nature of the lesion. Microsurgical nerve-preserving decompression provides favorable outcomes. Vigilant long-term follow-up is essential due to high recurrence potential.

The patient reported satisfaction with the surgical outcome, particularly noting improvement in sensation. She appreciated the multidisciplinary follow-up and occupational therapy support, which helped her return to daily activities.

## Declarations

None

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## Ethics approval and consent to participate

Not applicable

## Consent for publication

Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information.

## Availability of data and material

All data generated analyzed during this study are included in this published article

## Competing interests

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## Editorial

# The Hidden Cost of Healing: Reducing the Carbon Footprint of Carpal Tunnel Surgery

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As healthcare professionals, our primary mandate has always been clear: help people live better, healthier lives. Yet, there is a quiet, uncomfortable irony in how we deliver that care. The very systems we rely on to heal are leaving behind a destructive trail of greenhouse gases, massive energy consumption, and mountains of physical waste. Globally, healthcare is responsible for roughly 4% to 5% of all greenhouse gas emissions, and inside our hospitals, the operating room is the single largest offender. As the climate crisis accelerates—a reality we are already feeling acutely here in Sri Lanka—we in the medical community have to finally reckon with our own environmental footprint.

When people think of surgical emissions, they usually picture massive, multi-hour operations. But in reality, volume matters just as much as complexity. Take carpal tunnel release (CTR), for instance. It is one of the most frequently performed hand surgeries on the planet. Because we do so many of these procedures every single year, even tiny adjustments to how we manage them can compound into massive environmental gains. The beautiful thing is that we don't need expensive, futuristic technology to make surgery greener. We just need the willingness to look at our daily routines and strip away what isn't truly necessary.

To fix a problem, we first have to understand its weight. In our field, we often look at a "Life Cycle Assessment," which essentially tracks the environmental impact of a procedure from cradle to grave—from the raw materials used to manufacture a tool to the moment it hits the waste bin. For a quick outpatient procedure like a carpal tunnel release, the per-case footprint feels negligible, but the cumulative math tells a different story. A basic outpatient visit usually generates about 2 to 3 kg of CO<sub>2</sub>. A simple 20 km round trip by a diesel bus contributes about 1.6 kg, while cleaning and autoclaving just one standard surgical tray adds another 0.12 kg, with facility electricity making up the rest. Multiply that by thousands of patients nationwide, and the collective impact is staggering. If we unnecessarily push that same minor case into a traditional, high-energy main operating room or use heavy anesthesia, that

carbon footprint explodes.

Reducing this impact is less about finding new ways to recycle and more about the art of omission—what I like to think of as "addition by subtraction." It starts with questioning where we choose to operate. Traditional main operating theatres carry a massive energy overhead, constantly running intense lighting and high-volume HEPA air filtration systems. By simply moving minor procedures like a CTR into an ambulatory procedure room or a clinic setting, we can cut that facility energy consumption to a fraction of the cost without compromising patient safety.

We can also change how we approach anesthesia. Inhaled volatile gases are incredibly potent drivers of global warming, and the physical pain of a tourniquet often forces us to use deeper sedation than we otherwise would. By embracing techniques like WALANT (Wide Awake Local Anesthesia No Tourniquet), we completely eliminate the need for these gases, skip complex preoperative testing, and radically shrink the waste generated by the anesthesia machine itself.

We also need to look closely at the steel on our tables. It is incredibly common to open a standard surgical tray packed with 30 to 40 instruments for a carpal tunnel release, even though we might only use four or five of them. Yet, every single unused instrument on that tray still has to go through the high-energy, water-heavy steam sterilization process afterward. Streamlining our trays down to the absolute essentials can lower the sterilization footprint by 75%.

Similarly, while advanced endoscopic techniques are highly innovative, they often come wrapped in disposable plastics and specialized single-use blade assemblies. When clinically appropriate, sticking to a classic open approach is simply kinder to the environment. Finally, we must look outside our hospital walls at the journey our patients take. Incorporating telemedicine for routine preoperative chats or simple postoperative wound checks can spare patients a physical trip to the clinic, effectively cutting the total carbon footprint of that entire surgical episode nearly in half.

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Our foundational medical ethic is *primum non nocere*—first, do no harm. In the twenty-first century, it is time we extend that promise to the very environment we inhabit. Making our surgical practices more sustainable does not mean lowering our standards of care or sacrificing excellent clinical outcomes. It just requires a shift in mindset. When we begin to treat environmental sustainability as a core component of clinical quality rather than an optional "green" afterthought, we protect both the patient on our table today and the world they will walk out into tomorrow.

## Case Report

## Staged Excision of an Intraosseous Hemangioma of the Maxilla via Gingival and Intranasal Approaches

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### Abstract

A 15-year-old female presented with a right-sided nasal osseous lesion, managed initially via a right upper gingival excision. Histopathology confirmed an intraosseous hemangioma. Clinical follow-up identified a remaining portion of the lesion, necessitating a planned second stage. Two years later, a piecemeal excision of the remnant was performed using an intranasal approach, safely preserving the infraorbital nerve. The patient experienced expected right-sided facial swelling post-operatively, underscoring the need for routine post-operative care and monitoring following maxillary surgery.

**Keywords:** Intraosseous hemangioma; Maxillary tumor; Intranasal approach; Infraorbital nerve; Staged excision

### Introduction

Intraosseous hemangiomas are relatively uncommon, slow-growing, benign vascular tumors. While they typically arise in the vertebral column or calvarium, primary intraosseous hemangiomas of the facial skeleton, particularly the maxillary bone, are exceedingly rare. Management primarily involves surgical excision, with the surgical approach dictated by the tumor's size, location, and proximity to vital structures. Complete resection is necessary to prevent persistent growth; however, staged interventions may be required to safely address remnant tissues. This report details the surgical management and follow-up of a right maxillary intraosseous hemangioma in an adolescent female, treated via a staged surgical protocol.

### Case Presentation

A 15-year-old female patient presented in April 2024 with an osseous lesion located on the right side of the nose. Initial clinical and radiological evaluation led to a surgical plan for the excision of the right nasal osseous lesion under general anesthesia. The first surgical intervention was performed on October 17, 2024. A right upper gingival incision was made to access the surgical site. A vascularized bony lesion over the right maxilla was identified, excised, and sent for histopathology. Hemostasis was

successfully achieved, and the gingiva was closed using 5-0 Monocryl sutures.



**Figure 1:** Pre-operative clinical appearance. Multi-panel view demonstrating the right-sided nasal osseous lesion prior to surgical intervention.

During an interval follow-up on May 16, 2025, clinical assessment identified a remaining part of the lesion, leading to a planned second-stage excision. On May 21, 2026, at the age of 17, the patient underwent a piecemeal excision of the remaining right maxillary osseous lesion. An intranasal approach was utilized to access the right maxilla, ensuring the infraorbital nerve and associated vessels were directly visualized and safeguarded. An intraoral incision was also utilized and closed with 4/0 Monocryl, followed by the insertion of a nasal pack to maintain hemostasis.



**Figure 2:** Post-operative assessment at two weeks

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## Results

Histopathological analysis of the decalcified bony tissue fragments from the primary surgery revealed lamellated bony fragments containing a vascular lesion. The lobules consisted of thin-walled blood vessels lined by flat endothelial cells without any malignant features, yielding a definitive conclusion of an intraosseous hemangioma.

Following the primary surgery in 2024, the patient was discharged with a three-week follow-up plan. She was prescribed oral Co-amoxiclav 625mg TDS. The duration of this postoperative prophylactic antibiotic therapy was closely monitored to ensure strict compliance with antimicrobial stewardship guidelines, effectively preventing infection while strictly limiting unnecessary prolonged antibiotic exposure.

Following the second-stage surgery in May 2026, the recovery plan involved a 12-day at-home convalescence. During the one-week review on May 29, 2026, the patient presented with anticipated right-sided facial swelling, which was successfully managed conservatively.

## Discussion

Surgical management of maxillary intraosseous hemangiomas requires careful planning to balance complete tumor removal with the preservation of facial aesthetics and function. The initial gingival approach allowed direct access but necessitated a subsequent intervention for the remnant lesion. The staged intranasal approach utilized for the remaining tissue proved highly beneficial, allowing for safe piecemeal excision without external facial scarring, while affording direct protection of the infraorbital nerve.

The postoperative development of right-sided facial swelling is an expected sequela of maxillary surgery. Vigilant postoperative monitoring remains important in maxillofacial procedures to manage localized edema and ensure the continued functional integrity of the safeguarded infraorbital nerve.

## Learning Points:

1. Intraosseous hemangiomas of the maxilla are rare but must be considered in the differential diagnosis of vascularized bony facial lesions.
2. A staged excision is a safe and viable strategy when remnant tissue is identified, prioritizing anatomical preservation over overly aggressive single-stage resections.
3. The intranasal approach provides an excellent, scarless route for addressing right maxillary lesions while allowing for the safe safeguarding of the infraorbital nerve.
4. Postoperative monitoring is essential to manage localized regional swelling and ensure the functional integrity of preserved neurovascular structures.

The complete eradication of maxillary intraosseous hemangiomas can be safely achieved through a staged, multi-approach surgical strategy. Utilizing an intranasal approach for remnant lesions offers a highly effective pathway that minimizes aesthetic morbidity and protects vital neurovascular structures. Close postoperative observation remains essential for managing expected regional swelling and ensuring uncomplicated wound healing.

## Declarations

None

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## Ethics approval and consent to participate

Approval from the institutional review board/ethics committee was obtained for the surgical management and follow-up detailed in this report. The patient and their legal guardians provided informed consent to participate.

## Consent for publication

Written informed consent was obtained from the patient and her legal guardians for the publication of this case report and any accompanying images or data.

## Availability of data and material

All data generated or analyzed during this study are included in this published article.

## Competing interests

The authors declare that they have no competing interests.

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<https://doi.org/10.1177/01455613241272466>

## Case Report

## Chronic Chromoblastomycosis of the Upper Limb: Serial Surgical Excision with Split-Thickness Skin Grafting in a 13-Year Refractory Case

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### Abstract

**Background:** Chromoblastomycosis remains one of the more frustrating chronic fungal infections in tropical surgical practice. Although prolonged itraconazole is standard first-line therapy, a subset of patients with extensive, multifocal disease simply do not respond to medical treatment alone — these are the patients who reach the plastic surgery clinic.

**Case Presentation:** We describe a 65-year-old Sri Lankan male with a 13-year history of chromoblastomycosis involving the left upper limb, referred after failure of prolonged itraconazole therapy and cryotherapy. Over 18 months he underwent four staged procedures comprising wide local excision of multiple lesions with split-thickness skin grafting (STSG). Initial graft take was 95%. Histopathology confirmed the diagnosis, with characteristic sclerotic bodies and pseudocarcinomatous hyperplasia; all specimens were clear of malignancy.

**Conclusion:** For extensive chromoblastomycosis refractory to medical therapy, serial surgical excision with STSG offers reliable reconstruction with good functional outcomes. The keys are adequate excision margins, careful patient selection, and acceptance that these cases usually require staged procedures rather than a single operation.

**Keywords:** chromoblastomycosis, split-thickness skin graft, wide local excision, neglected tropical disease, *Fonsecaea*, reconstructive surgery

### 1. Introduction

Chromoblastomycosis is not a condition most plastic surgeons encounter regularly, but in tropical practice it lands on our doorstep with increasing frequency. It is a chronic granulomatous fungal infection caused by dematiaceous fungi, most commonly *Fonsecaea pedrosoi*, predominantly affecting agricultural workers [1][2], and is now recognised by the WHO as a neglected tropical disease [3].

The typical presentation is warty, hyperkeratotic plaques or cauliflower-like nodules, usually on the

lower limbs, though upper limb involvement is well documented. The hallmark histological finding is the muriform cell, or “copper penny” — a thick-walled, brown, septate structure that is pathognomonic [2][4]. Diagnosis is straightforward once biopsy is performed; management is anything but. First-line itraconazole 200–400 mg daily for 6–24 months is standard, yet cure rates are disappointing — between 15% and 80% depending on the series [5] — and recurrence after apparently successful treatment exceeds 40% [6]. Terbinafine is an alternative, and combination therapy has been advocated for refractory cases, but drug access and long-term compliance remain significant barriers [2].

What concerns the surgeon most is the long-term sequelae: lymphedema, chronic ulceration, secondary infection, and dense fibrosis [4]. More worryingly, disease beyond 10 years carries a documented risk of malignant transformation to squamous cell carcinoma in 2–13% of cases [7][8]. We present this case to illustrate the reconstructive surgical approach to extensive, multifocal disease that has failed conservative management.

### 2. Case Presentation

#### 2.1 Background

Mr. W, a 65-year-old shopkeeper from Mathugama, presented to our Plastic Surgery Unit at the National Hospital of Sri Lanka in late 2024. He had carried a diagnosis of chromoblastomycosis since 2013, initially managed at Colombo South Teaching Hospital with cryotherapy and oral itraconazole. Despite years of treatment — taken intermittently, unsurprising given the duration required — the disease had relentlessly progressed across his left upper limb: the elbow flexor region, volar forearm, dorsum of the hand, and thenar eminence. A 2020 biopsy had confirmed chromoblastomycosis with pseudocarcinomatous hyperplasia and sclerotic bodies within multinucleated giant cells.

His comorbidities included hypertension, type 2 diabetes on metformin, and dyslipidaemia, along with Grade III–IV fatty liver with mild hepatomegaly on abdominal ultrasound and mildly deranged liver enzymes (AST 35 U/L, ALT 53 U/L, bilirubin 1.7 mg/dL) attributed to prolonged itraconazole exposure

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— a significant consideration when weighing further high-dose antifungal therapy and prolonged postoperative antibiotic cover.

2.2 Clinical Findings

On general examination he was thin but well, clinically euthyroid, with stable vital signs and no pallor or jaundice. The left upper limb showed firm, non-tender, hyperkeratotic plaques with verrucous surfaces and surrounding lichenification. The “black dots” of extruded sclerotic bodies were visible to the naked eye — almost diagnostic in an endemic area [9]. Crucially, there was no regional lymphadenopathy, no distal neurovascular compromise, and hand function was preserved: our goal was not only to clear disease but to maintain a functional limb.

Fresh biopsies from three sites (elbow, thenar eminence, dorsum of hand) all confirmed chromoblastomycosis with pseudoepitheliomatous hyperplasia, chronic granulomatous inflammation, and numerous muriform sclerotic bodies, with no dysplasia or malignancy — reassuring, though with a 13-year history we remained vigilant.



Figure 1- Preoperative appearance of the left upper limb

2.3 Surgical Management

The decision to operate was straightforward: the disease was extensive, multifocal, had failed years of medical therapy, and the risk of malignant transformation in a 13-year lesion was a genuine concern. We planned staged wide local excision with STSG, accepting from the outset that multiple procedures would be needed. Over 18 months, the patient underwent four procedures:

First Procedure — 20 October 2024. The largest lesion, on the left forearm, was excised under combined supraclavicular block and spinal anaesthesia with a 5 mm margin of clinically normal tissue, and resurfaced with a meshed STSG from the left thigh applied without quilting. With meticulous haemostasis, limb elevation, and 48 hours of IV co-amoxiclav, day-2 inspection showed ~95% take. The donor site healed within three weeks and he was discharged on day 6 with oral antibiotics and standard analgesia.

Second Procedure — March 2025. Additional left forearm lesions were excised and grafted (left thigh STSG, supraclavicular block).

Day-5 discolouration and blistering over the dorsum of the hand was managed conservatively with curettage, drainage, and Vaseline dressings; the graft settled and healed.

Third Procedure — 8 November 2025. Disease had progressed to the left arm, forearm, and dorsum of the hand. All affected lesions were excised and resurfaced with STSG from the right postero-lateral thigh, protected in a backslab, with good take on inspection.

Fourth Procedure — 14 June 2026. Four lesions over the left elbow flexor region and thenar eminence were excised under general anaesthesia. Left thigh STSG resurfaced the elbow and thenar defects; the dorsum of the hand was closed primarily with 3-0 nylon. He was discharged on day 2 after an uneventful recovery.



Figure 2- The left elbow region during postoperative wound care following the fourth procedure, showing the healing grafted bed with marginal epithelialization and healthy granulation (a, b).



Figure 3- Postoperative appearance of the left upper limb at follow-up: matured split-thickness skin grafts over the forearm and dorsum of the hand (a, b) and the elbow region (c, d), with no contracture and no clinical evidence of recurrent disease.

## 2.4 Postoperative Course and Follow-up

All excised specimens confirmed chromoblastomycosis with clear margins and no evidence of malignant transformation. At the most recent follow-up the grafts had matured well, colour match was acceptable, there was no contracture limiting movement, and no clinical evidence of residual or recurrent infection (Figure 2). He has been counselled on long-term surveillance: with recurrence rates above 40% [6], these patients must be followed for years, not months.

## 3. Discussion

### 3.1 When to Stop Medical Therapy and Operate

There is no hard rule for when to abandon medical therapy for surgery. The decision rests on disease extent, failure of a reasonable antifungal trial (at least 6–12 months of compliant treatment), patient preference, and complications such as chronic ulceration, secondary infection, or concern for malignancy. Here, his hepatic steatosis and abnormal bilirubin made continued high-dose itraconazole unattractive. Posaconazole has been reported in refractory cases [10], but availability and cost remain barriers in our setting.

### 3.2 Surgical Technique and the Malignancy Question

Wide local excision with at least a 5 mm margin of healthy-appearing tissue is essential: chromoblastomycosis extends beyond the visible lesion, and incomplete excision is the commonest cause of post-surgical recurrence [6]. All specimens should be sent for histology, both to confirm the diagnosis and to verify clear margins.

We chose STSG over full-thickness grafts or local flaps for several reasons: the defects were too large for primary closure; STSG survives better on a potentially suboptimal bed; meshing allows fluid egress and reduces seroma risk; and the thigh donor site heals reliably and can be re-harvested — as demonstrated over 18 months here.

Any patient with chromoblastomycosis beyond 10 years should be considered at risk for squamous cell carcinoma. Azevedo and colleagues reported SCC in seven patients, all with disease duration exceeding a decade [7]; the mechanism is thought to be chronic inflammation-mediated DNA damage, and coexisting pseudocarcinomatous hyperplasia can make the histological distinction challenging [8]. Every specimen from our patient was scrutinised for dysplasia — none was found, but the risk persists for any future recurrence.

### 3.3 Graft Survival and Practical Lessons

STSG failure in contaminated wounds is well documented; postoperative infection is the strongest independent risk factor for graft failure (odds ratio 48.3) [11], with Gram-negative colonisation by *Pseudomonas* or *Klebsiella* particularly problematic [12][13]. Here, complete excision of diseased tissue, meticulous haemostasis, limb elevation, and co-amoxiclav prophylaxis in a well-nourished, immunocompetent patient worked in our favour.

Three practical points deserve emphasis. First, accept that extensive chromoblastomycosis usually requires staged procedures — clearing everything in one sitting risks prolonged anaesthesia, donor-site morbidity, and compromised graft outcomes. Second, not every defect needs a graft: the small recurrent elbow lesion we managed with simple elliptical excision and primary closure healed uneventfully. Third, compliance with follow-up is as important as compliance with medication — regular review for at least 2–3 years is needed to detect recurrence early.

## 4. Conclusion

Extensive chromoblastomycosis refractory to medical therapy

remains a challenging problem in tropical surgical practice. This case demonstrates that a planned programme of serial wide local excision with split-thickness skin grafting can achieve good functional and cosmetic outcomes even in long-standing multifocal disease. The keys to success are adequate excision margins, meticulous technique, appropriate patient selection, and acceptance that multiple procedures may be necessary. Given the risk of malignant transformation in long-standing lesions, early surgical referral should be considered for patients with extensive or refractory disease.

**Informed Consent:** Written informed consent was obtained from the patient for publication of this case report and accompanying images.

**Conflicts of Interest:** None declared.

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## Research Article

# Outcomes of lymphovenular anastomosis in the treatment of lymphedema affecting the upper and lower extremities.

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## Abstract

**Background:** Lymphedema of the extremities is a chronic disabling condition associated with impaired mobility, recurrent cellulitis, and reduced quality of life. Lymphovenular anastomosis (LVA) has emerged as a minimally invasive physiological surgical treatment; however, evidence regarding its outcomes in Sri Lanka remains limited. This study evaluated the functional outcomes, complications, and patient satisfaction following LVA.

## Methods

A prospective cohort study was conducted among six patients who underwent LVA at the Plastic Surgery Unit, National Hospital of Sri Lanka, during 2024. Patients with upper or lower extremity lymphedema secondary to malignancy, congenital causes, filariasis, or radiotherapy were included. Patients younger than 18 years, those with Grade IV lymphedema, or those who had undergone other lymphedema procedures were excluded. Data regarding demographics, functional outcomes, complications, and patient satisfaction were collected using interviewer-administered questionnaires.

## Results

Six patients were included (66.7% female; median age 29–39 years). In our study population, lower extremity lymphedema was more prevalent than upper extremity lymphedema (66.7% vs. 33.3%). Prior to surgery, all patients experienced limb heaviness, while most reported reduced range of motion and recurrent cellulitis despite conservative management. Following LVA, 66.7% reported reduced limb stiffness and 50% demonstrated improved mobility. Overall patient satisfaction was high, with only one patient (16.7%) requiring secondary liposuction. Postoperative wound infection occurred in two patients (33.3%) and was associated with lower satisfaction scores.

## Conclusions

Lymphovenular anastomosis provides meaningful functional improvement and high patient satisfaction in selected patients with extremity lymphedema.

Despite the risk of postoperative wound infection, LVA represents an effective physiological surgical option and supports the incorporation of lymphatic reconstruction into comprehensive lymphedema management in Sri Lanka.

**Keywords:** Lymphedema; Lymphovenular anastomosis; Lymphatic reconstruction; Upper extremity; Lower extremity; Sri Lanka.

## Introduction

Lymphedema of the upper and lower extremities presents a significant clinical challenge, profoundly impacting patient mobility, increasing susceptibility to infection, and diminishing overall quality of life.

While conservative management remains a staple, lymphovenular anastomosis (LVA) has emerged as a promising, minimally invasive surgical intervention. By creating direct connections between obstructed lymphatic vessels and adjacent venules, LVA facilitates physiological fluid drainage and reduces limb swelling. Despite refined surgical techniques, a critical need remains to evaluate LVA's real-world clinical outcomes to optimize patient selection and inform evidence-based treatment algorithms.

Existing literature underscores the procedure's potential efficacy across various patient populations. Regarding upper extremity outcomes, a systematic review of 14 studies (published through June 2020) reported volume or circumference improvements ranging from 0% to 100%, concluding that LVA is a safe and efficient treatment for decompressive-resistant upper extremity lymphedema, particularly in lower-stage disease (1).

Similarly, a 2019 study (n=26) in Goettingen, Germany, with an average 23-month follow-up, found that 50% of therapy-resistant patients reported subjective improvement, with early-stage upper extremity patients deriving the most benefit (2). In the context of lower extremity lymphedema (LEL), a systematic review encompassing 6,260 patients (through June 2021) demonstrated objective improvement rates between 23.3% and 100%, again noting the most substantial enhancements in early-stage LEL (3).

Beyond limb volume, a single-center prospective study of 100 upper and lower extremity cases followed over 24 months found that while limb circumference did not significantly improve, LVA yielded positive outcomes regarding the frequency of cellulitis episodes, reliance on compression garments, manual lymphatic drainage (MLD) sessions, and overall quality of life (5).

By systematically evaluating the functional outcomes, patient-reported experiences, and long-term efficacy of LVA, this study aims to bridge the gap between theoretical supramicrosurgery and practical application. Ultimately, elucidating predictors of treatment success will enhance patient care and advance the contemporary management paradigm for lymphedema

## Methods

This prospective cohort study followed up 6 patients who had undergone lymphovenular anastomosis during the year 2024 at the plastic surgical unit, National hospital of Sri Lanka, Colombo. Patients diagnosed with upper and lower extremity lymphedema following excision of malignancies, congenital lymphedema, Filariasis, irradiation were included in the study. Patients who are under the age of 18 years, those who have undergone other surgical interventions for lymphedema beside LVA or with Grade 4 lymphedema were excluded from the study. Interviewer administered questionnaires were used to collect data on demography, treatment, outcome, complications and its effects to the patient. An information sheet was distributed among patients with explanation of the study and consent. Ethical approval was also obtained.

## Results

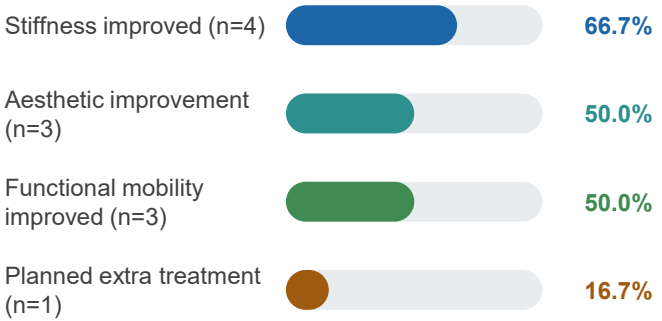
| Demographic Characteristic  | Count (n) | Percentage (%) |
|-----------------------------|-----------|----------------|
| <b>Gender</b>               |           |                |
| Female                      | 4         | 66.7           |
| Male                        | 2         | 33.3           |
| <b>Age Category (years)</b> |           |                |
| 29–39                       | 3         | 50.0           |
| 40–50                       | 1         | 16.7           |
| 51–61                       | 1         | 16.7           |
| 62–72                       | 1         | 16.7           |

**Table 1: Demographic Characteristics of Patients Underwent Lymphovenular Anastomosis (N=6)**

The condition most commonly affected the lower extremities (66.7%, n=4) compared to the upper extremities (33.3%, n=2).

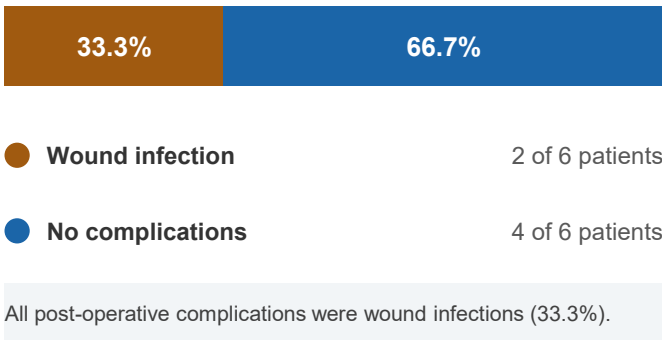
Patients managed their condition with various conservative therapies: 83.3% utilized compression bandages, 83.3% relied on pharmacological therapies (predominantly prophylactic Penicillin), and 50% participated in physical or occupational therapy. Pre-operative complications were highly prevalent; all patients (100%) experienced limb heaviness, and the majority suffered from a reduced range of motion and frequent cellulitis episodes

### Functional & Subjective Outcomes after LVA (N=6)



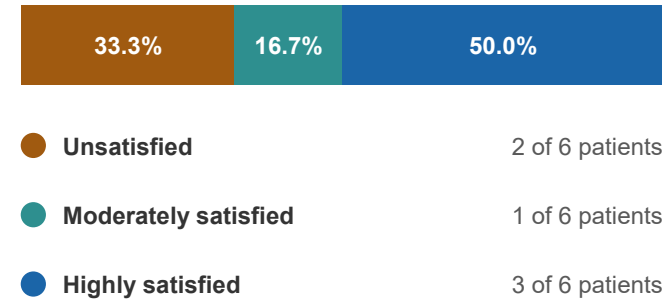
**Figure 1.1 - Functional and Subjective Outcomes after LVA**

### Post-operative Complications after LVA (N=6)



**Figure 1.2 – Post Operative complications after LVA**

### Patient Satisfaction after LVA (N=6, mean 7.5/10)



**Figure 1.3 - Patient Satisfaction Post LVA**

## Discussion

This study demonstrates that Lymphovenous Anastomosis (LVA) is a functionally beneficial treatment for extremity lymphedema in Sri Lanka. Mirroring global literature, our cohort showed significant functional improvements despite 100% having previously relied on intensive conservative management: 66.7% experienced reduced limb stiffness and 50% gained improved mobility.

The procedure's positive impact on patient quality of life is validated by high peak satisfaction scores and a low need for secondary interventions (only 16.7% required liposuction). However, post-operative wound infections (33.3%) directly correlated with lower satisfaction, emphasizing the critical need for meticulous perioperative care and patient selection.

## Conclusion

Lymphovenular anastomosis serves as a beneficial surgical intervention for patients with upper and lower extremity lymphedema. It improves functional mobility and significantly reduces limb stiffness for the majority of patients, while yielding positive aesthetic outcomes. While post-operative wound infections can impact overall patient satisfaction, the procedure strongly supports the integration of surgical lymphatic reconstruction into standard lymphedema care protocols in Sri Lanka.

## Declarations

None

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## Ethics approval and consent to participate

Ethical approval was also obtained. An information sheet was distributed among patients with explanation of the study and consent to participate.

## Consent for publication

Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information

## Availability of data and material

All data generated or analyzed during this study are included in this published article.

## Competing interests

The authors declare that they have no competing interests.

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## From Scarcity to Innovation: Amniotic Membrane as a Viable Alternative to Cadaveric Skin in a Sri Lankan Burns Unit

### Case Series

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#### Abstract

**Introduction:** Managing extensive thermal injuries in resource-limited settings presents profound clinical challenges due to the critical scarcity of autologous donor sites and the fluctuating availability of cadaveric skin. Human amniotic membrane (HAM) serves as a crucial, innovative biological bridge in developing healthcare systems.

**Case presentation:** We report three female patients (ages 24, 35, and 40) with severe burn injuries ranging from 15% to 55% total body surface area (TBSA). Surgical management included early tangential excision combined with HAM application, alongside cadaveric skin and keratinocyte transfers in select cases. Clinical courses were complicated by severe sepsis, multi-organ failure, and adverse drug reactions (DRESS syndrome). Management required rigorous antimicrobial stewardship—auditing treatment durations for precise compliance with microbiological sensitivities. While the 55% TBSA patient demonstrated excellent local wound healing with HAM but ultimately succumbed to systemic sepsis, the remaining two patients achieved successful wound closure and survived complex systemic and local infections.

**Discussion:** The integration of HAM provides highly viable, cost-effective biological dressing. It accelerates wound healing, controls fluid loss, and prepares the wound bed, yielding outcomes comparable to advanced bioengineered skin substitutes.

**Conclusion:** HAM serves as an essential alternative to traditional skin substitutes in resource-constrained global burn units, effectively providing temporary physiological wound closure, though it cannot completely avert the mortality risks of profound systemic sepsis in massive burns.

**Keywords:** Human amniotic membrane; Burn injuries; Biological dressing; Antimicrobial stewardship; Skin substitute; Wound healing

#### Introduction

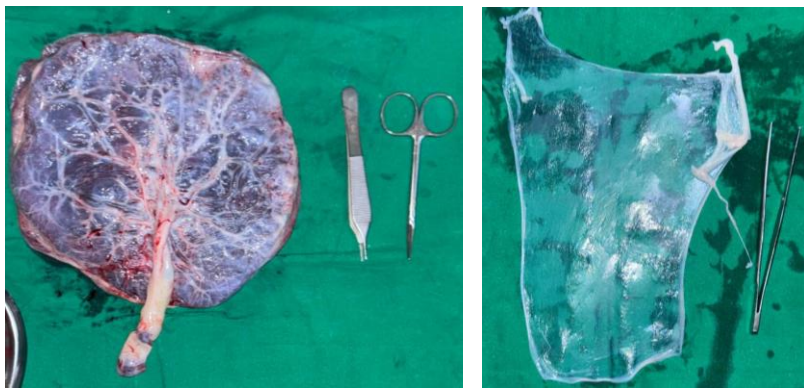
The rapid reconstruction and coverage of massive

soft-tissue defects following thermal injury demand aggressive surgical strategies. In patients with significant burns, autologous donor sites are often scarce or compromised by localized infections. Early tangential excision must be followed by immediate biological coverage to halt fluid loss, prevent heat loss, and mitigate burn wound sepsis. In Sri Lankan burn units, where the availability of cadaveric skin banks can fluctuate, human amniotic membrane (HAM) serves as a critical, innovative alternative. This case series examines three distinct clinical scenarios where HAM was utilized to provide temporary physiological wound closure and salvage compromised grafts until definitive healing could occur.

#### Case Presentation

##### Case 1

A 35-year-old female sustained a 55% TBSA kerosene burn injury involving the face, neck, upper chest, and back, complicated by suspected inhalation injury. Following initial resuscitation, she was transferred to the intensive care unit. On post-burn day (PBD) 3, she underwent platysmectomy and tangential burn excision. Due to profound donor skin limitations, coverage was achieved using cadaveric split-thickness skin grafts alongside a HAM transfer. A subsequent burn wound excision with cultured keratinocyte transfer was performed on post-operative day (POD) 9. Her intensive care course was complicated by severe hypoalbuminemia and sepsis. To ensure appropriate compliance with medical guidelines, her antimicrobial therapy was strictly audited, completing a targeted 6-day course of intravenous Piperacillin-Tazobactam. While her extensive wounds demonstrated excellent adherence and healing under the biological dressings, her systemic condition deteriorated. Despite aggressive critical care, she ultimately passed away due to overwhelming sepsis and multi-organ failure.



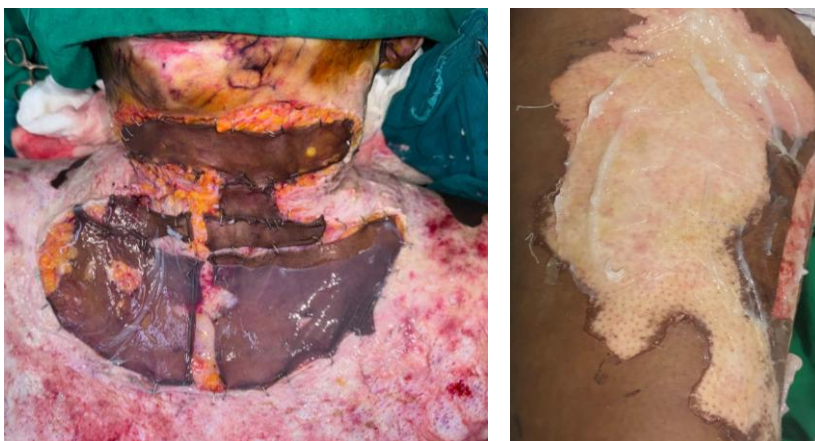
**Figure 1:** (A) Gross appearance of the human placenta. (B) Harvested human amniotic membrane (HAM) prepared for use as a biological dressing.

#### Case 2

A 40-year-old female presented with a 15% TBSA hot water burn injury. On PBD 12, following burn wound excision and split-thickness skin grafting to bilateral thighs, she experienced profound graft failure secondary to a *Pseudomonas* infection. Her clinical picture was further complicated by non-oliguric acute kidney injury (AKI) and the development of DRESS syndrome (Drug Reaction with Eosinophilia and Systemic Symptoms). To salvage the wound bed and promote re-epithelialization, HAM was applied. Her DRESS syndrome was managed with a tapering course of oral prednisolone under strict dermatological follow-up. To ensure optimal antibiotic stewardship and minimize systemic toxicity, her regimen was carefully audited; she completed a targeted 7-day course of intravenous Clindamycin and a 9-day course of Meropenem to clear the localized infection. By PBD 108, the donor site and burn wounds had successfully healed, and she was transitioned to topical gel dressings with stable glycemic control.

#### Case 3

A 24-year-old female presented following a 42% TBSA self-inflicted flame burn. During her surgical management, she received an application of HAM combined with a keratinocyte spray, followed by burn wound excision and skin grafting to bilateral breasts. Her recovery was initially complicated by severe breast engorgement, managed successfully with manual expression and a stat dose of cabergoline. Her clinical course was dominated by recurrent, complex sepsis requiring dynamic antimicrobial management driven by strict clinical auditing and microbiological guidelines. An initial empiric regimen of intravenous Meropenem and Teicoplanin was audited and ceased at day 10 upon microbiological review. Subsequent fever spikes revealed *Klebsiella* bacteremia, prompting targeted intravenous Colistin therapy. A later blood culture on PBD 42 returned positive for Gram-positive cocci; adhering to microbiological stewardship principles, Colistin was immediately omitted and Vancomycin was initiated. Comprehensive systemic screening ruled out embolic seeding. She was successfully stabilized, cleared of bacteremia, and continued on routine psychiatric follow-up.



**Figure 2:** Intraoperative application of human amniotic membrane (HAM) as a biological dressing over the excised burn wound bed.

## Discussion

The management of severe burns in resource-constrained settings necessitates innovative approaches to wound coverage. Current literature strongly supports the use of human amniotic membrane as a primary or adjunctive biological dressing across varied clinical presentations—from massive TBSA coverage to localized graft salvage.

Recent robust analyses confirm that HAM is highly efficacious in burn care, yielding wound healing outcomes comparable to other advanced bioengineered skin substitutes. Furthermore, the novel application of amniotic bilayer dressings co-cultured with keratinocytes has shown significant promise as a definitive skin substitute in adult burn patients, closely mirroring the combined techniques utilized in Cases 1 and 3 of this series. Comprehensive reviews reinforce HAM's critical role in the immediate management of burn wounds, noting its ability to reduce exudate, control localized *Pseudomonas* colonization (as seen in Case 2), and prepare the wound bed.

Studies validate the efficacy and feasibility of HAM across various burn presentations, noting its distinct benefits in accelerating healing when used alongside conventional treatments. Research into cell-based substitutes and HAM has consistently demonstrated their ability to accelerate regeneration, act as a potent graft fixator, and reduce overall donor site morbidity. Ultimately, HAM serves as a highly effective and accessible alternative to synthetic membranes in environments where traditional allografts are unavailable.

## Conclusion

The integration of human amniotic membrane provides a reliable, innovative bridge to definitive coverage in severe thermal injuries and compromised graft sites. This case series demonstrates that HAM effectively controls local infection and promotes epithelialization, offering a highly practical solution to the scarcity of donor skin in Sri Lankan burns units. However, while HAM is a vital tool for local wound control, it cannot completely avert the profound mortality risks associated with systemic sepsis and multi-organ failure in massive burns.

## Patient Consent

Written informed consent was obtained from the surviving patients and the next of kin of the deceased patient for the publication of this case series.

## Ethical Approval

Formal ethical approval was not required for this case report in accordance with institutional policy.

## Funding

No funding was received for this study.

## Conflict of Interest

The authors declare no conflicts of interest.

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