



Critical Rounds Newsletter VOL 4 | Issue 42 | 2023

Dear Doctor,

Greetings from Micro Labs Limited. We are happy to bring you **"Critical Rounds Newsletter"** which contain latest and interesting news in the field of Critical Care.

This issue contains:

1. **A Study on Isolated diastolic dysfunction is and its association with mortality in critically ill patients.**
2. **A Study on sensitivity of skin biopsy in patients with meningococcal purpura fulminans.**
3. **The effectiveness of Right Median Nerve Electrical Stimulation in promoting emergence from coma.**
4. **A Rare case of Bilateral Infectious Extensor Tenosynovitis**

Should you require any article or, medical information, please feel free to contact us medicalservices@microlabs.in

free to contact us at medicalservices@microlabs.in

Looking forward to your valuable feedback

Best Regards,
Medical Team, Micro Labs Limited



1. A Study on Isolated diastolic dysfunction is and its association with mortality in critically ill patients.

Introduction:

Critical care patients who have cardiac dysfunction may experience multiorgan failure and a higher mortality rate.¹ Although prevalence and its effects on mortality are not fully understood, left ventricular (LV) diastolic dysfunction is significant in critically sick individuals.² Researchers categorised patients in intensive care with normal left ventricular function using the most recent diastolic recommendations, and looked into correlations with mortality.

Isolated diastolic dysfunction, assessed by a multi-parameter approach, is common in critically ill patients and is associated with mortality.

Methods:

This study examined the systolic dysfunction in ICU patients using data from a single-center prospective observational study. No history of cardiac disease, including heart failure, cardiomyopathies, coronary artery disease, significant valvular disease, or arrhythmias, LVEF > 50%, absence of regional hypokinesia, absence of acute, ongoing cardiac disease, such as myocardial infarction, sinus rhythm at the time of echocardiography, and having at least two recorded diastolic variables were the inclusion criteria for this study cohort. Within 24 hours of being admitted to intensive care, an echocardiogram was done. Patients with aberrant regional wall motion, lower LV ejection fraction, or a history of heart illness were excluded. The 2016 EACVI recommendations, Recommendations for the Evaluation of LV Diastolic Function by Echocardiography, were used to categorise patients.

Results:

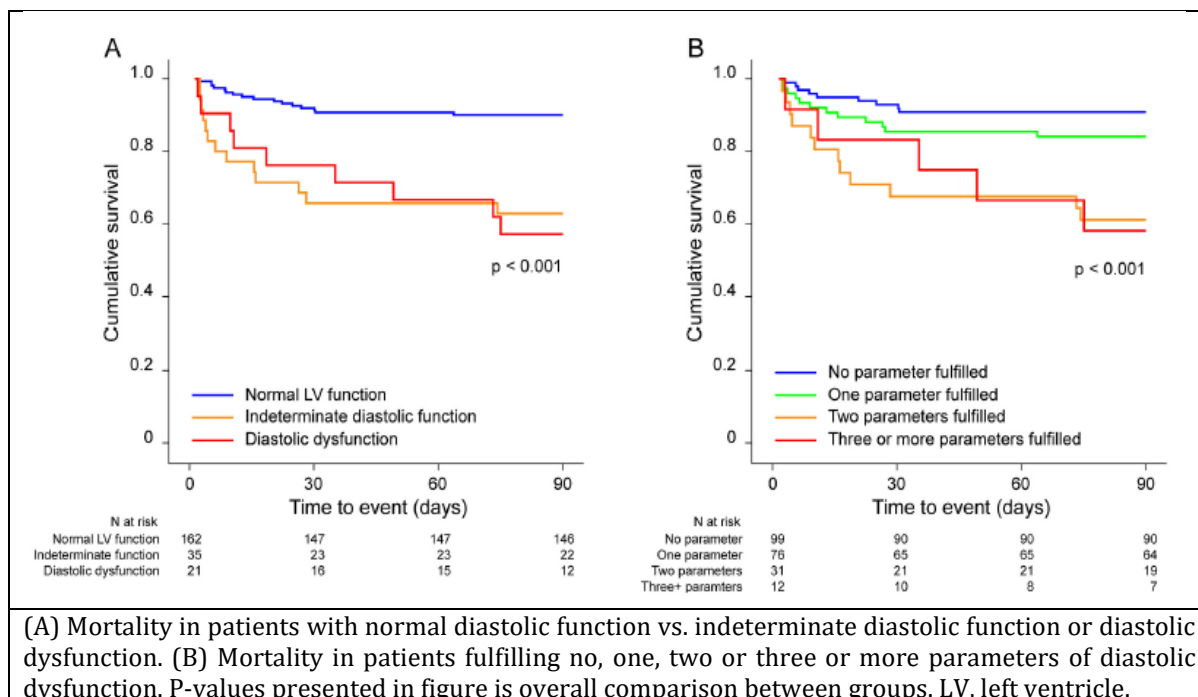
Of the 218 patients, 162 (74%) had diastolic function that was normal, 21 (10%) had diastolic dysfunction, and 35 (17%) had diastolic function that was indeterminate. Diastolic dysfunction was more prevalent in older, female, and sepsis patients as well as those who also had respiratory and cardiovascular comorbidities and a higher SAPS Score. Patients with indeterminate diastolic dysfunction (OR 4.3 [1.6-11.4], $p = 0.004$) or diastolic dysfunction (OR 5.1 [1.6-16.5], $p = 0.006$) had a higher risk of death at 90 days compared to patients with normal diastolic function, according to a risk-adjusted logistic regression model.

Discussion:

This study's key conclusion was that 1) ICU patients with normal LV systolic function frequently develop early LV diastolic dysfunction, and 2) LV isolated diastolic dysfunction is associated with a higher mortality risk. In this investigation, the individuals who met the criteria for isolated diastolic dysfunction had a fourfold higher chance of mortality. Notably, the risk of death was the same for patients with indeterminate diastolic function.² Increased mortalities has been observed in patients with indeterminate



function in other studies^{3,4}, and Researchers suspect that a significant number of patients with indeterminate function had diastolic dysfunction.



Conclusion:

Diastolic dysfunction, which is frequently present in ICU patients without a history of cardiac illness and with satisfactory LVEF, is linked to higher mortality. A multi-parameter method to measuring diastolic dysfunction has higher connections with mortality than a single parameter approach.

References:

1. Cavefors O, Holmqvist J, Bech-Hanssen O, Einarsson F, Norberg E, Lundin S, et al. Regional left ventricular systolic dysfunction associated with critical illness: incidence and effect on outcome. *ESC Heart Fail* 2021;8(6):5415–23.
2. Cavefors O, Ljung Faxén U, Bech-Hanssen O, Lundin S, Ricksten SE, Redfors B, Oras J. Isolated diastolic dysfunction is associated with increased mortality in critically ill patients. *J Crit Care*. 2023 Mar 20;76:154290.
3. Playford D, Strange G, Celermajer DS, Evans G, Scalia GM, Stewart S, et al. Diastolic dysfunction and mortality in 436360 men and women: the National Echo Database Australia (NEDA). *Eur Heart J Cardiovasc Imaging* 2021;22(5):505–15.
4. Chung YJ, Choi KH, Lee SH, Shin D, Hong D, Park S, et al. Prognostic impact of indeterminate diastolic function in patients with functionally insignificant coronary stenosis. *J Am Soc Echocardiogr* 2023;36(3):295–306.

2. A Study on sensitivity of skin biopsy in patients with meningococcal purpura fulminans

Introduction:

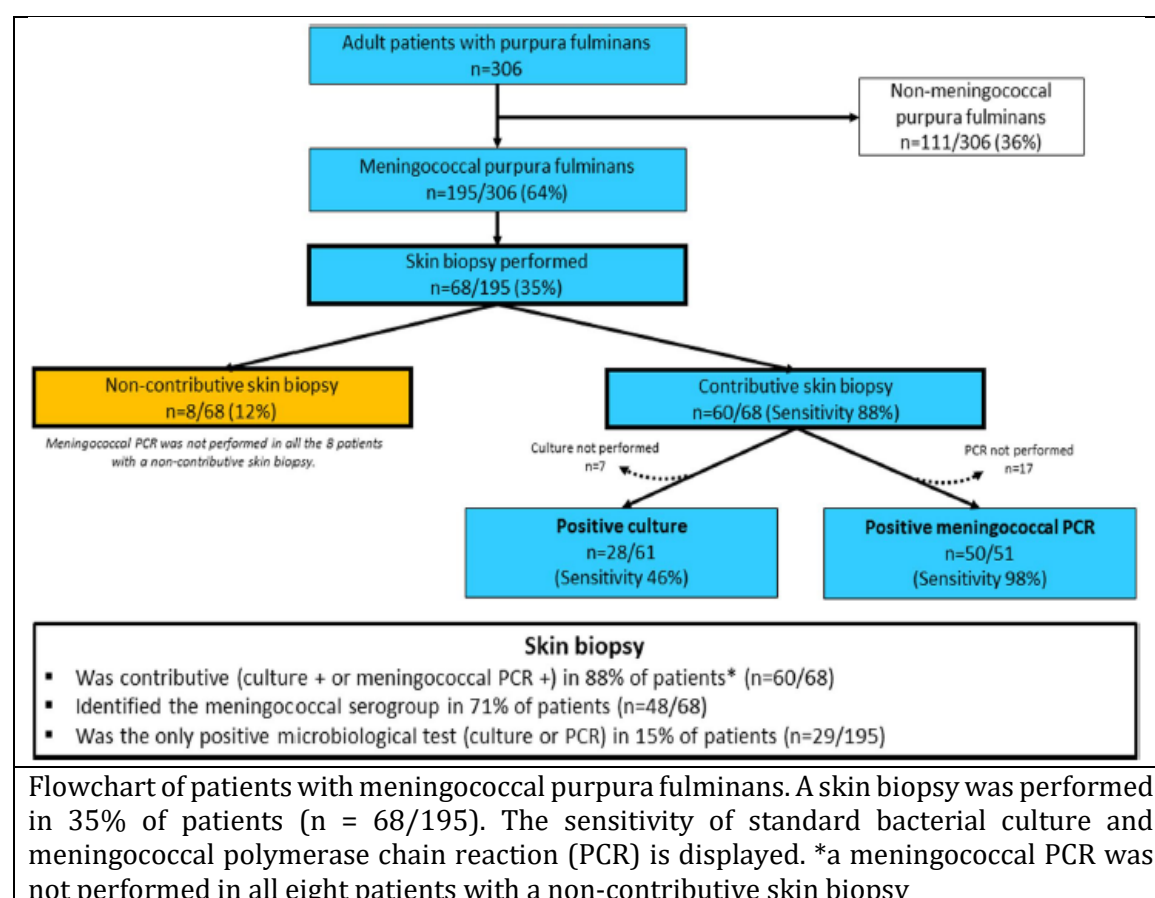


A uncommon, life-threatening infection called purpura fulminans(PF) is characterised by the concurrent appearance of a quick, widespread purpuric rash and an abrupt cardiovascular collapse. Young patients with no prior comorbidities are frequently affected by PF. The etiological microorganisms are *Streptococcus pneumoniae* and *Neisseria meningitidis*.¹ The primary causative bacterium of Purpura fulminans (PF), which accounts for two thirds of PF, is *Neisseria meningitidis*. Skin biopsy is a straightforward and less invasive procedure that enables the detection of *Neisseria meningitidis* using skin culture and polymerase chain reaction (PCR).² The objective of this study was to evaluate the sensitivity of skin biopsies in adult meningococcal PF patients.

The overall sensitivity of skin biopsies using conventional culture and meningococcal polymerase chain reaction is 88%.

Methods:

This was a 17-year multicentre retrospective study that included adult patients who underwent a skin biopsy with conventional and/or meningococcal PCR and were admitted to the ICU for a meningococcal PF. Among the 306 patients admitted for PF, 195 (64%) had meningococcal PF, and 68 (35%) of them had a skin biopsy. Patients with and without skin biopsies are compared.



Results:



Among the 306 patients with PF who were admitted, 195 (64%) had meningococcal PF, and 68 (35%) of them had a skin biopsy. A skin biopsy was done on the average 1 day following the start of antibiotic therapy. In 28 (46%) of the 68 patients who underwent standard culture of skin biopsies, *Neisseria meningitidis* was grown. 51 of 68 patients (75%) had *Neisseria meningitidis* PCR on skin biopsy, and 50 (98%) of them had positive results. Five of these 50 meningococcal PCR tests that were positive were done three days or more after the start of antibiotic therapy. Finally, 60/68 (88%) of the patients judged the skin biopsy to be helpful. Skin biopsy was used to identify the meningococcal serogroup in 48/68 (71%) of the individuals.

Discussion:

Only one-third of the meningococcal PF patients in this sample underwent a skin biopsy. When a meningococcal PCR is carried out, a skin biopsy appears to be helpful in the majority of patients with meningococcal PF.² Skin biopsy is an easy, minimally invasive procedure that enables the detection of *Neisseria meningitidis* even days after the start of antibiotic therapy using skin culture and polymerase chain reaction (PCR).³ The diagnostic effectiveness of skin biopsies in individuals with suspected meningococcal infections was rarely evaluated.

Conclusion:

Skin biopsy should be routinely taken into consideration in cases of suspected meningococcal PF even after the start of antibiotic therapy because it has an overall sensitivity of 88% when combined with conventional culture and meningococcal PCR.

References:

1. Contou D, de Prost N. Purpura fulminans de l'adulte [Purpura fulminans in adult patients]. *Rev Prat.* 2023 Jan;73(1):71-78.
2. Contou D, Béduneau G, Rabault C, Sonnevile R, Marchalot A, Coudroy R, Roux D, Cour M, Massol J, Préau S, de Prost N; HOPEFUL Study Group. Skin biopsy in adult patients with meningococcal purpura fulminans: a multicenter retrospective cohort study. *Crit Care.* 2023 Apr 30;27(1):166.
3. de Risi-Pugliese T, Servy A, Decousser J-W, Nebbad B, Desroches M, Wolkenstein P, et al. Skin biopsy polymerase chain reaction for rapid microbiological diagnosis in patients with purpura fulminans. *Br J Dermatol.* 2017;177: e154-5.

3. The effectiveness of Right Median Nerve Electrical Stimulation in promoting emergence from coma.

Introduction:

Traumatic Brain Injury (TBI) can occur as a result of anything from a minor hit to the head to a severe injury to the brain. TBI, particularly moderate to severe TBI, is a leading cause of injury-related mortality and disability.¹ Depending on the degree of the injury, TBI might cause a loss of consciousness. TBI can cause a sudden coma and, in certain cases, a prolonged disorder of consciousness (pDOC).² The purpose of this study was to determine if

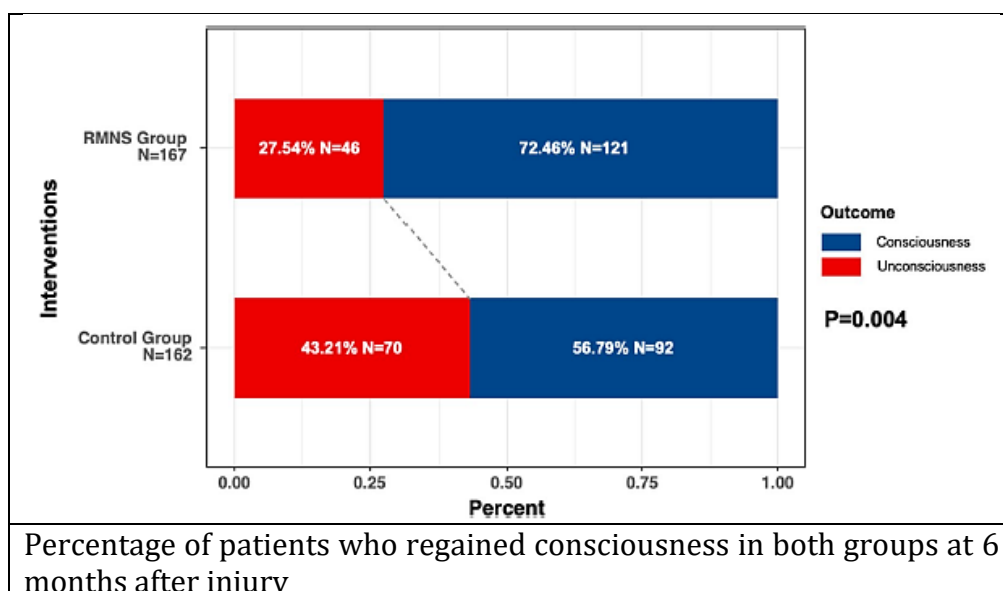
Right median nerve electrical stimulation may be an effective therapy for patients with an acute traumatic coma.



right median nerve electrical stimulation is a safe and effective treatment for accelerating coma emergence following a TBI.

Methods:

This randomised controlled experiment was conducted in 22 hospitals. Participants in an acute coma 7-14 days after a TBI were assigned (1:1) to receive routine therapy and right median nerve electrical stimulation (RMNS group) or routine care (control group). For two weeks, the RMNS group received 20 mA, 300 s, 40 Hz stimulation pulses that lasted 20 seconds per minute, eight hours per day. The proportion of patients who regained consciousness 6 months after injury was the primary outcome. Secondary endpoints included Glasgow Coma Scale (GCS), Full Outline of Unresponsiveness Scale (FOUR), Coma Recovery Scale-Revised (CRS-R), Disability Rating Scale (DRS), and Glasgow Outcome Scale Extended (GOSE) scores reported as medians on 28 days, 3 months, and 6 months after injury, as well as GCS and FOUR scores on days 1 and 7 during stimulation. The intention-to-treat population was used for primary analyses.



Results:

A total of 329 participants were recruited, with 167 allocated to the RMNS group and 162 allocated to the control group. At 6 months' post-injury, a larger proportion of patients in the RMNS group regained consciousness than in the control group (72.5%, n = 121, 95% CI 65.2-78.7% vs. 56.8%, n = 92, 95% CI 49.1-64.2%, p = 0.004). GOSE at 3 and 6 months (5 [interquartile range (IQR) 3-7] vs. 4 [IQR 2-6], p = 0.002; 6 [IQR 3-7] vs. 4 [IQR 2-7], p = 0.0005) and FOUR at 28 days (15 [IQR 13-16] vs. 13 [interquartile range (IQR) 11-16], p = 0.002) were significantly higher in the RMNS group. Trajectory analysis revealed that the RMNS group had considerably faster GCS, CRS-R, and DRS improvement (p = 0.01, 0.004, and 0.04, respectively). Both groups experienced similar adverse effects. The stimulation device was not related with any major adverse effects.



Discussion:

Right median nerve electrical stimulation 8 hours per day for two weeks revealed a clinically substantial effect on emergence from coma, as well as improvement of aware level and functional result in this trial involving subjects with a traumatic coma 7-14 days after brain injury.² Right median nerve stimulation has also been used to treat conditions such as spinocerebellar ataxia, essential tremor, and autonomic nervous system dysfunction.^{2,3,4}

Conclusion:

This study concludes that right median nerve stimulation, delivered within two weeks of TBI and sustained for two weeks, results in greater and faster emergence from coma at 6 months as compared to control participants. Right median nerve stimulation may be an effective treatment for patients in acute coma after severe traumatic brain injury.

References:

1. Georges A, M Das J. Traumatic Brain Injury. [Updated 2023 Jan 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; Jan 2023.
2. Wu X, Xie L, Lei J, Yao J, Li J, Ruan L, Hong J, Zheng G, Cheng Y, Long L, Wang J, Huang C, Xie Q, Zhang X, He J, Yu X, Lv S, Sun Z, Liu D, Li X, Zhu J, Yang X, Wang D, Bao Y, Maas AIR, Menon D, Xue Y, Jiang J, Feng J, Gao G; ACES Participants. Acute traumatic coma awakening by right median nerve electrical stimulation: a randomised controlled trial. *Intensive Care Med*. 2023 May 13:1–12.
3. Reis C et al (2021) Essential tremor amplitude modulation by median nerve stimulation. *Sci Rep* 11(1):17720
4. Maharjan A et al (2022) Investigation of the optimal parameters of median nerve stimulation, using a variety of stimulation methods, and its effects on heart rate variability: a systematic review. *Neuromodulation* 25:1268–1279

4. A Rare case of Bilateral Infectious Extensor Tenosynovitis

Introduction:

Tenosynovitis refers to the inflammation of the fluid-filled synovium within the tendon sheath. Depending on the aetiology, it frequently appears as discomfort, swelling, and contractures. The condition may impact any tendon in the body that is enclosed by a sheath, but it is most common in the hand, wrist, and foot.¹ Infectious extensor tenosynovitis is an uncommon infection that spreads along the tendons of the extensor muscles of the extremities. Given its ambiguous signs and symptoms, it provides a diagnostic difficulty in the emergency department (ED), as compared to the more prevalent flexor tenosynovitis, which is diagnosed by the characteristic Kanavel findings on physical exam.² Here is a case of bilateral extensor tenosynovitis in a patient who denied denying direct trauma or IV drug use.

Extensor tenosynovitis should be considered in anyone who has soft tissue edoema on the dorsum of the hand, even if the findings are bilateral.

Case Presentation:



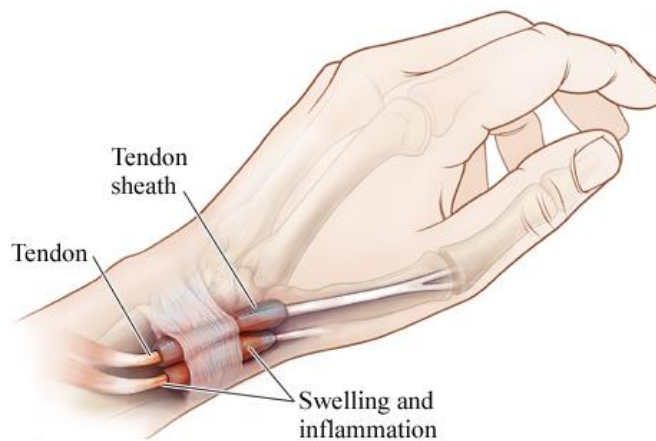
A 52-year-old female with no prior medical history went to the Emergency department with bilateral hand edoema and pain that had been present for two days. The patient stated that she had strained her back a few days before, While holding a rope on my left shoulder. She went to an out-of-town hospital, where she was diagnosed with a rotator cuff tear and given IV morphine in the left upper extremity. As a result, she suffered swelling in her left hand. She returned to the outpatient hospital, where she was given IV morphine in the right upper extremity and experienced right hand swelling. The patient denied having experienced any direct harm to her hands. The only way to relieve the discomfort was to immerse her hands in cold water. She also supported atraumatic left knee edoema. The patient admitted to smoking marijuana and having a distant history of methamphetamine use, but he denied using nicotine, alcohol, or IV drugs at the time. When the patient arrived, he was afebrile, with an oral temperature of 36.6° Celsius, tachycardic to 110 beats per minute, and a blood pressure of 142/106 millimetres of mercury. The examination revealed puffy edoema on the dorsal side of the bilateral hands extending to the wrists, as well as mild erythema bilaterally over the dorsum with no overlaying induration or fluctuation. The range of motion of the fingers and wrists was bilaterally intact although slightly reduced by edoema. There was no pain associated with wrist micromotion. With robust bilateral radial pulses, quick capillary refill, and soft compartments, sensation was maintained. A physical examination of the left knee indicated minor erythema and edoema across the distal leg, as well as warmth over the knee. The knee had full range of motion but pain at the extremes of motion. The compartments were soft, and the dorsalis pedis pulse was soft. Rheumatologic disorders such as rheumatoid arthritis and systemic lupus erythematosus, viral aetiologies, and allergic reactions to IV morphine were among the initial differential diagnoses. Rheumatologic disorders were at the top of the differential due to the various locations of arthralgias without any direct trauma and mild erythema with intact range of motion. The absence of considerable erythema or induration in the edoema was less consistent with cellulitis. In a patient with no history of IV drug use, intact range of motion with arthralgias in several sites pointed away from septic arthritis. Given the absence of fever, out-of-proportion pain, crepitus, or bullae, necrotizing soft tissue infection was also ruled out. White blood cell count of 20,000 per millimeter³ (K/ mm³), 22% bands (0-9%), complement reactive protein (CRP) 631.2 mg/L, and rheumatoid factor 45 IU/mL were discovered in laboratory investigations. Radiographs of the hands and wrists indicated no acute fractures or dislocations, but did show extensive soft tissue edoema. Concerned about bacterial infection, IV ceftriaxone and vancomycin were started because to laboratory findings of leukocytosis, bandemia, and a significantly elevated CRP. A point-of-care ultrasound revealed bilateral wrist effusions and fluid surrounding the extensor tendon sheaths. Orthopaedic surgery was consulted, and bilateral wrist arthrocentesis with purulent fluid aspiration was performed. Synovial fluid analysis revealed nucleated cell counts of 37,200 cells/microliter and 36,850 cells/L, respectively, and a proportion segmented neutrophils of 92% (and 98%, respectively). Arthrocentesis was also performed on the left knee, and synovial fluid examination revealed a nucleated cell count of 24,000 cells/mm³ and a segmented neutrophil proportion of 90%. A CT scan of the bilateral upper extremities revealed bilateral extensor tenosynovitis and



numerous abscesses on the dorsal hands. The patient was admitted to the inpatient service for extensor tenosynovitis and septic arthritis before being transferred to the operating room by orthopaedic surgery. Tenosynovectomies revealed left extensor tenosynovitis in hand compartments three and four and right extensor tenosynovitis in hand compartments two, three, and four. Irrigated and debrided the bilateral septic wrist joints and left septic knee joint. Bacteria and fungi did not grow in wound cultures or blood cultures. The Neisseria gonorrhoea test resulted in a negative result. Broad-spectrum antibiotics were continued inpatient, and she was discharged on day 10 with a three-week regimen of trimethoprim/sulfamethoxazole.

Discussion:

This is an unusual instance of extensor tenosynovitis, made even more remarkable by the fact that it occurred bilaterally and without trauma.² Tenosynovitis occurs when an infected or inflammatory fluid fills a possible gap between the visceral and parietal layers of the tendon sheath.³ Infection is frequently introduced through penetrating trauma or IV drug usage, and it can spread to



neighbouring structures through the parietal tendon sheaths.² Because the extensor tendons are less isolated than the flexor tendons, infection is less likely to be limited to the extensor tendons. Extensor tenosynovitis symptoms can be general, but they include discomfort, edema, and erythema on the dorsum of the extremities.²

Conclusion:

Extensor tenosynovitis should be considered in the differential diagnosis of anyone presenting with dorsum of the hand soft tissue edema. Bilateral infections are uncommon, although they do occur. While waiting for a CT, MRI, or surgical consult, point-of-care ultrasound can aid in the diagnosis of extensor tenosynovitis. Any patient with an exceptionally elevated CRP more than 350 mg/L should be assumed to have an infection until proven otherwise, and antibiotics should be administered as soon as possible, given the significant death rate associated with these CRP values. Surgical irrigation and debridement are the gold standard for diagnosing and treating extensor tenosynovitis.

References:

1. Georges A, M Das J. Traumatic Brain Injury. [Updated 2023 Jan 2]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; Jan 2023.
2. Osipchuk D, Riddell J. Bilateral Infectious Extensor Tenosynovitis: A Case Report. Clinical Practice and Cases in Emergency Medicine. 2023 Apr 12.
3. Sexton DJ and Leversedge FJ. Infectious tenosynovitis. 2022. Available at: www.uptodate.com/contents/infectious-tenosynovitis. Accessed May 19, 2023.



This scientific input is prepared from the Department of Medical Services, an initiative of M/s Micro Labs Limited under the aegis of Micro Knowledge Academy. The information contained herein is for education purpose only. The content is developed by compiling information from various authentic and published literatures. Although great care has been taken to assure the accuracy of the publication, M/s Micro Labs Limited shall not be responsible or in any way liable for any inaccuracy, errors, or omissions resulting from negligence or otherwise howsoever or any consequences arising there from. In spite of best efforts, the information in this publication may become outdated over time. M/s Micro Labs Limited shall not be responsible in any manner whatsoever, for any action taken, opinions expressed, advice rendered or accepted, any direct, incidental, special or consequential loss and damage caused on the basis of any material or information presented in this publication / update.