RESEARCH ARTICLE

DOI: 10.4274/AdvRadiolImaging.galenos.2024.35220
Advanced Radiology and Imaging 2024;1(1):13-16

Relationship Between Mesenteric Lymphadenitis and SIRS

Eren Tobcu[1], Zeynep Tobcu[2]

[1]Gürsu Cüneyt Yıldız State Hospital, Clinic of Radiology, Bursa, Turkey
[2]Bursa Uludağ University Faculty of Medicine, Department of Pediatrics, Bursa, Turkey

Abstract

Objectives: Mesenteric lymphadenitis is a condition characterized by inflammation of the lymph nodes in the mesentery. Systemic inflammatory response syndrome (SIRS) is a clinical response to a non-specific insult, which can be caused by various factors such as infection, trauma, burns, or other severe bodily stresses. The study aims to investigate the relationship between mesenteric lymphadenitis and SIRS, hospitalization, and treatment.

Methods: This single-center retrospective cohort study was conducted. A total of 58 patients who presented to the emergency department with acute abdominal pain and were diagnosed with mesenteric lymphadenitis on computed tomography were evaluated.

Results: A total of 58 patients (27 males and 31 females) with mesenteric lymph adenitis were included in the study. Fever of 37.5 °C and above was recorded in 5 patients (8.6%). Fourteen patients (24.1%) had leucocytosis. Twenty-four patients (41.4%) had elevated CRP. The mean CRP in this group was 15.2±14.1 mg/L. Tachycardia was detected in four patients (6.9%). Tachypnoea was recorded in 3 patients (5.2%). In our study, 12 patients (20.7%) fulfilled SIRS criteria. The most frequently met SIRS criteria in these mesenteric lymphadenitis patients were fever (n=5), white cell count (n=14), heart rate (n=4) and respiratory rate (n=3). In our study, the hospitalisation rate tended to be higher in the SIRS group (4/12 patients) compared to the non-SIRS group (1/46 patients).

Conclusion: The rate of SIRS (+) was lower in patients diagnosed with mesenteric lymphadenitis. The group with SIRS (+) was more likely to accompany additional radiological comorbidity and hospitalization rates. The group with SIRS (+) was more likely to accompany additional radiological comorbidity and hospitalization rates.

Keywords: SIRS, mesenteric lymphadenitis, emergency radiology, fever

Introduction

Mesenteric lymphadenitis is characterized by inflammation of the lymph nodes in the mesentery. This condition typically presents with symptoms such as abdominal pain, fever, and gastrointestinal problems. Mesenteric lymphadenitis is usually caused by bacterial or viral infections and is more common in children and young adults. Diagnosis is typically made through a physical examination, blood tests, and imaging studies such as ultrasound or computed tomography (CT) scans to rule out other causes of abdominal pain. Once diagnosed, mesenteric lymphadenitis is usually treated with rest, painkillers, and antibiotics if there is evidence of bacterial infection.[1,2]

Systemic inflammatory response syndrome (SIRS) is a clinical response to a nonspecific insult that can be caused by various factors such as infection, trauma, burns, or other severe bodily stresses. It is characterized by a widespread inflammatory response that can lead to organ dysfunction and failure if not manage promptly and effectively.[3-5]

While it is important to consider the potential relationship between mesenteric lymphadenitis and SIRS, it is also crucial to acknowledge that not all cases of mesenteric lymphadenitis lead to SIRS. Mesenteric lymphadenitis is primarily a localized inflammatory condition, and its progression to SIRS depends on various factors such as the severity of the infection and the individual's overall health status. Furthermore, studies have shown that the incidence of SIRS in patients with mesenteric lymphadenitis is low compared with that in patients with other systemic inflammatory conditions.[6] However, numerically indicating the frequency of SIRS occurrence in patients with mesenteric lymphadenitis is not straightforward because of the variability in patient populations, diagnostic criteria, and reporting standards. Typically, mesenteric lymphadenitis is considered less severe than conditions leading to SIRS and often resolves without progressing to a more systemic inflammatory state. The inflammatory response in mesenteric lymphadenitis tends to be contained within the abdominal area and may not always meet the criteria for a systemic inflammatory response.[1,2]

It is essential to approach the potential connection between mesenteric lymphadenitis and SIRS from a balanced perspective, considering the variability in individual responses and the specific causative factors involved in each case. Although mesenteric lymphadenitis can lead

Address for Correspondence: Eren Tobcu MD, Gürsu Cüneyt Yıldız State Hospital, Clinic of Radiology, Bursa, Turkey
Phone: +90 541 923 74 47 **E-mail:** etobcu@bandirma.edu.tr **ORCID ID:** orcid.org/0000-0002-0144-0142
Received: 09.03.2024 **Accepted:** 24.04.2024

to systemic effects in some situations, it is not a universal outcome and should be assessed on a case-by-case basis. When the literature was searched, no study analyzed the relationship between mesenteric lymphadenitis and SIRS in detail.

The aim of this study was to evaluate the relationship between mesenteric lymphadenitis and SIRS.

Methods

Ethical approval was obtained from the Bandırma University Local Ethics Committee (KAEK-2024-01-01.1578) for this study, and the Helsinki principles were followed.

This retrospective cohort study was conducted at a single center over a 1-year period. Because this was a retrospective study, informed consent forms were not obtained from the patients.

A total of 58 patients who presented to the emergency department with acute abdominal pain and were diagnosed with mesenteric lymphadenitis on CT were evaluated. These patients evaluated were between the ages of 7 and 21. Patients whose CT was of poor quality and unsuitable for evaluation were excluded from the evaluation. Some pediatric patients aged 7-9 years were excluded from the study because of movement during imaging and an inability to cooperate with breath-holding instructions. Individuals diagnosed with conditions such as colitis, appendicitis, and other similar diagnoses, including mesenteric lymphadenitis, were also excluded. Furthermore, individuals with a history of hematological diseases were not included in the study.

Clinical, laboratory, and radiologic scans were obtained from the radiology information system and electronic medical record system.

Computed Tomography Scanners and Parametres

In this study, a 128-slice single-detector Somatom Go Top (Siemens, Erlangen, Germany) was used for abdominal CT imaging. The scan parameters included a field of view of 256 mm, a voltage of 120 kV, a current of 60 mA, and a slice thickness of 1 mm.

CT imaging was conducted during the portal venous phase using an iohexol nonionic contrast agent, except in patients with severe disease, renal failure (eGFR <30 mL/min), and suspected kidney stones.

Computed Tomography Diagnosis

All images were evaluated collaboratively by a radiology specialist with 10 years of experience and a radiology assistant with 1 year of experience. The radiologic diagnosis of mesenteric lymphadenitis was based on the following features: 3 mesenteric lymph nodes with a short axis diameter of 8 mm without any underlying inflammatory process identifiable by CT.[2]

Clinical Patient Data

The electronic medical record system and radiology information system were examined for admission complaints, vitals, blood results, and laboratory values of patients admitted to the emergency department. Patient age, gender, symptoms, examination findings, vital signs, C-reactive protein (CRP), and white blood cell (WBC) values were summarized.

Systemic Infammatory Response Syndrome

The vital characteristics and blood tests of the patients were evaluated according to whether they met the SIRS criteria.[4,5,7]

SIRS diagnostic criteria are met when at least two of the following are present.

1. Body temperature >38 °C or <36 °C,

2. Heart rate (HR) >90 beats per minute (bpm),

3. Respiratory rate (RR) >20 breaths/min,

4. White cell count (WCC) >12,000/mm^3 or <4000/mm^3.

Statistical Analysis

Statistical analysis was performed using Microsoft Excel functions on data entered a Microsoft Excel spreadsheet. Means, mean values, standard deviations (SD) and ranges were calculated for all continuous variables. A simple count analysis was performed for all variables. All qualitative information such as physical examination findings and radiological report data were noted. Odds ratio was used to investigate the association between mesenteric lymphadenitis and SIRS. The IBM Statistical Package for the Social Sciences statistics program was used when compared groups and p value <0.05 was considered statistically significant.

Results

A total of 58 patients (27 males and 31 females) with mesenteric lymphadenitis were included in the study. The mean age of these patients was 17.4±15.0 (mean±SD) years. Fever of 37.5 °C was recorded in 5 patients (8.6%). Fourteen patients had leucocytosis (24.1%) (WBC >11×10^9/L). The mean WBC count in the leucocytosis group was 14.7±12.1×10^9/L. Twenty-four patients (41.4%) had elevated CRP (>10 mg/L). The mean CRP level in this group was 15.2±14.1 mg/L. Tachycardia (>100 bpm) was detected in four patients (6.9%). The median HR in the tachycardic group was 123 bpm. Tachypnea (>20 breaths per minute) was recorded in 3 patients (5.2%). The median RR in the tachypneic group was 27 breaths/min. In our study, 12 patients (20.7%) fulfilled the SIRS criteria. The most frequently met SIRS criteria in these mesenteric lymphadenitis patients were fever (n=5), WCC (n=14), HR (n=4), and RR (n=3) (Figures 1 and 2).

Following CT diagnosis and treatment of mesenteric lymphadenitis, 53 (91.4%) patients were discharged directly from the emergency department and 5 (8.6%) patients were hospitalized. In our study, the hospitalization rate tended to be higher in the SIRS group (4/12 patients) than in the non-SIRS group (1/46 patients) (p<0.05).

In the SIRS-positive group, an additional radiological comorbidity not associated with mesenteric lymphadenitis was detected in 5/12 patients, 3 of whom were hospitalized.

Comorbidities included renal calculi (n=1), epiploic appendicitis (n=2), colitis (n=1), and Coronavirus disease-2019 (COVID-19) pneumonia (n=1) (Figure 1). In contrast, 7/12 patients in the SIRS-positive group had only mesenteric lymphadenitis without any other radiological comorbidity.

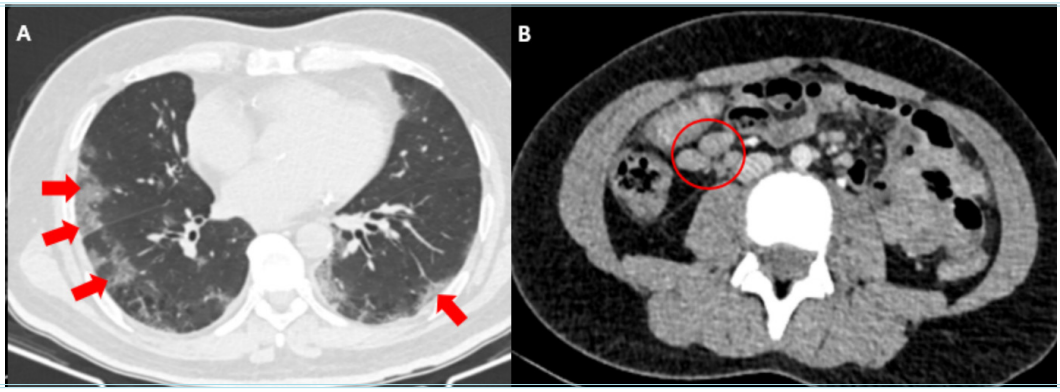

Figure 1. A) Non-contrast thorax CT axial slices show diffuse peripheral ground-glass opacities in a 35-year-old male patient with a diagnosis of COVID-19 (arrows). B) Contrast-enhanced abdominal CT axial sections show mesenteric lymphadenopathies with a short axis greater than 1 cm in the parachecal area in the right lower quadrant of the abdomen in the same patient with COVID-19 (circle). When evaluated together with clinical and laboratory data, it was confirmed to be compatible with mesenteric lymphadenitis

CT: Computed tomography, COVID-19: Coronavirus disease-2019

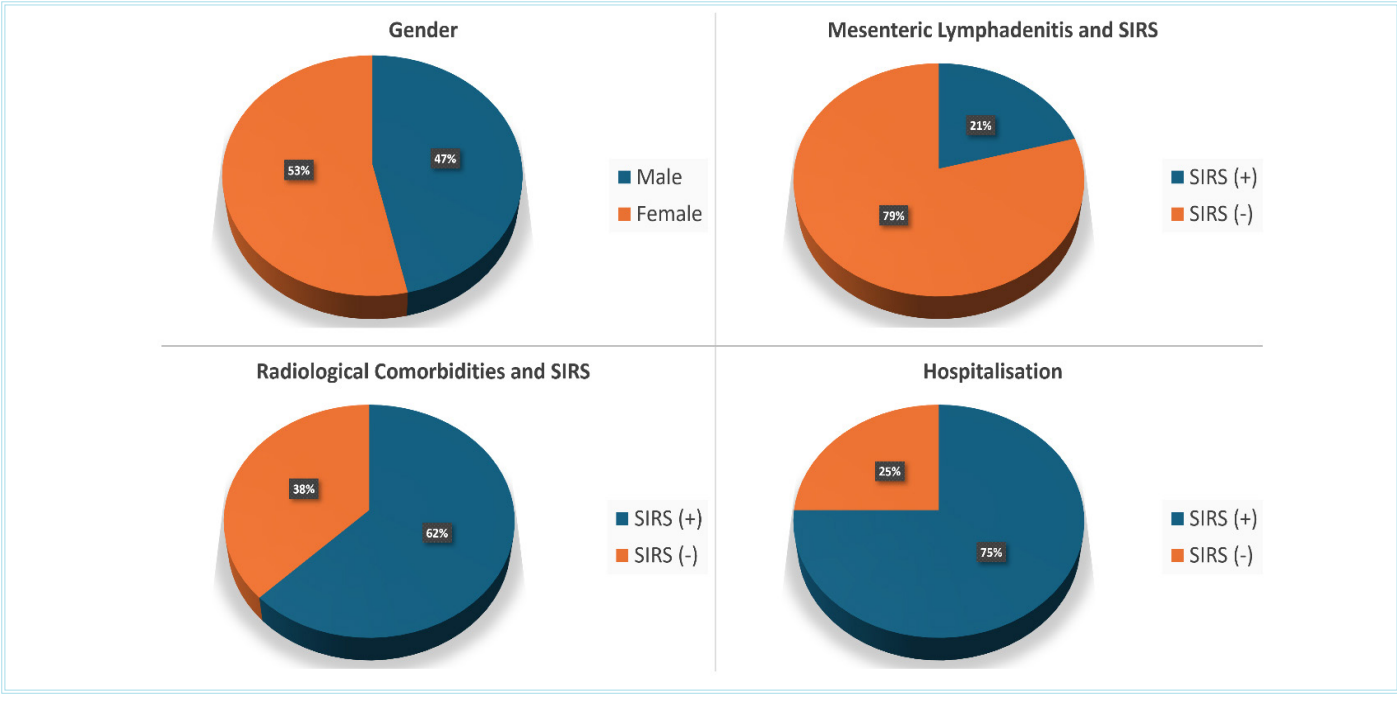

Figure 2. Gender distribution, percentage of SIRS, percentage of radiological comorbidities, hospitalization rates of patients diagnosed with SIRS

SIRS: Systemic inflammatory response syndrome

In the non-SIRS group, only 3/46 (6.5%) patients had radiological comorbidities, of whom only 1 was hospitalized. These comorbidities included urinary tract infection (n=3). All patients (discharged and admitted) were treated conservatively. Fifty-four patients received analgesia only, and four patients received antibiotics and analgesics.

Discussion

The relationship between mesenteric lymphadenitis and SIRS represents a complex interplay of local and systemic inflammatory responses. Mesenteric lymphadenitis, primarily characterized by swollen lymph nodes in the mesentery without an obvious cause of infection, often presents with symptoms similar to those of acute appendicitis.[8,9] Although typically self-limiting in nature, understanding when and how SIRS might progress is crucial for early diagnosis and management.[3,10]

SIRS is a generalized state of inflammation that can be triggered by a myriad of infectious and non-infectious causes, potentially leading to severe outcomes like sepsis or organ failure.[3,7] The criteria for diagnosing SIRS include the presence of two or more symptoms, such as fever, tachycardia, tachypnea, or altered WBC count.[5]

Studies indicate that while mesenteric lymphadenitis is primarily a localized infection, systemic symptoms suggesting SIRS can occasionally emerge, especially if the lymphadenitis is part of a broader infectious or inflammatory process[11,12]. For instance, elevated inflammatory markers

typically associated with SIRS, such as CRP and higher WBC counts, have been observed in some patients with mesenteric lymphadenitis.[8,13,14]

Furthermore, the progression from mesenteric lymphadenitis to SIRS appears to be influenced by factors such as patient age, immune status, and presence of comorbid conditions. Young children and immunocompromised patients are particularly susceptible to such progression because of their relatively weaker immune responses.[1,3]

Management strategies for mesenteric lymphadenitis should therefore not only focus on alleviating local symptoms but also monitor signs of systemic inflammation to prevent escalation to SIRS. Early intervention with antibiotics or supportive care reduces the likelihood of progression and improves outcomes.[3,10]

In our study, 58 individuals with mesenteric lymphadenitis (27 men and 31 women) were included in the research. Twenty-seven percent of the individuals in our study met the SIRS requirements. In these patients with mesenteric lymphadenitis, fever, WCC, HR, and respiration rate were the most common SIRS criteria that were satisfied. The SIRS group in our study had a greater hospitalization rate than the non-SIRS group.

Conclusion

Although mesenteric lymphadenitis and SIRS are primarily distinct conditions, their intersection in clinical scenarios underscores the importance of vigilant assessment and management to prevent potentially life-threatening complications. Further research is needed to better understand the mechanisms that underpin their relationship and refine strategies for intervention and management.

To the best of our knowledge, this is the first study in the literature to evaluate the relationship between mesenteric lymphadenitis and SIRS. Among the limitations of our study may be that it is monocentric, retrospective, and the number of patients is relatively small. It is also important to keep in mind that SIRS has a low specificity for infection and that age, immunosuppression, and pharmaceutical interactions can disguise specific criteria. As a result, the true prevalence of SIRS positivity may be underestimated, but it is anticipated to be greater.

Ethics

Ethics Committee Approval: Ethical approval was obtained from the Bandırma University Local Ethics Committee (KAEK-2024-01-01.1578).

Informed Consent: Since the study was a retrospective study, informed consent was not required by the ethics committee.

Authorship Contributions

Surgical and Medical Practices: E.T., Concept: E.T., Z.T., Design: E.T., Z.T., Data Collection or Processing: E.T., Analysis or Interpretation: E.T., Z.T., Literature Search: E.T., Writing: E.T., Z.T.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

References

1. Lucey BC, Stuhlfaut JW, Soto JA. Mesenteric lymph nodes seen at imaging: causes and significance. Radiographics. 2005;25:351-65.
2. Helbling R, Conficconi E, Wyttenbach M, et al. Acute Nonspecific Mesenteric Lymphadenitis: More Than "No Need for Surgery". Biomed Res Int. 2017;2017:9784565.
3. Robertson CM, Coopersmith CM. The systemic inflammatory response syndrome. Microbes Infect. 2006;8:1382-9.
4. Jaimes F, Garcés J, Cuervo J, et al. The systemic inflammatory response syndrome (SIRS) to identify infected patients in the emergency room. Intensive Care Med. 2003;29:1368-71.
5. Bone RC, Balk RA, Cerra FB, et al. Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. The ACCP/SCCM Consensus Conference Committee. American College of Chest Physicians/ Society of Critical Care Medicine. Chest. 1992;101:1644-55.
6. Roy P. An observational clinical study to find out most common causes of SIRS at Sher-E-Bangla Medical College. JMSCR. 2018;6:487-91.
7. Knaus WA, Sun X, Nystrom O, Wagner DP. Evaluation of definitions for sepsis. Chest. 1992;101:1656-62.
8. Toorenvliet B, Vellekoop A, Bakker R, et al. Clinical differentiation between acute appendicitis and acute mesenteric lymphadenitis in children. Eur J Pediatr Surg. 2011;21:120-3.
9. Lucey BC, Stuhlfaut JW, Soto JA. Mesenteric lymph nodes: detection and significance on MDCT. AJR Am J Roentgenol. 2005;184:41-4.
10. Balk RA. Systemic inflammatory response syndrome (SIRS): where did it come from and is it still relevant today? Virulence. 2014;5:20-6.
11. Rao PM, Rhea JT, Novelline RA. CT diagnosis of mesenteric adenitis. Radiology. 1997;202:145-9.
12. Macari M, Hines J, Balthazar E, Megibow A. Mesenteric adenitis: CT diagnosis of primary versus secondary causes, incidence, and clinical significance in pediatric and adult patients. AJR Am J Roentgenol. 2002;178:853-8.
13. Birkhold M, Langenburg S. Is mesenteric adenitis a benign condition? Ischemic colitis secondary to mesenteric adenitis in a 12 year old. J Pediatr Surg Case Rep. 2016;15:19-21.
14. Ansar W, Ghosh S. Inflammation and Inflammatory Diseases, Markers, and Mediators: Role of CRP in Some Inflammatory Diseases. Biology of C Reactive Protein in Health and Disease. 2016:67-107.