Review Article

Understanding spinal gout: A comprehensive study of 88 cases and their clinical implications

ABSTRACT

Background: Spinal gout, a rare and often underdiagnosed condition, significantly impacts patients' quality of life. Therefore, the aim of the research is to analyze cases of spinal gout, including clinical features, anatomical location of spinal gout, laboratory studies, imaging studies, treatment choices, and outcomes from various cases of spinal gout.

Methods: The author conducted a systematic literature search in the PUBMED and Science Direct databases from 2013 to 2023. We included clinical case presentations of spinal cases in adults, published in English. The three researchers independently reviewed the title and abstract of each article, and any differences in opinions were resolved through consensus. The extracted data were subsequently analyzed descriptively.

Results: A total of 88 cases of spinal gout were obtained and studied. Out of the total reviewed cases of spinal gout, 89.77% of the subjects were male, with an average age of 51.9 years (age range 16–87 years). Common symptoms include back/neck pain (78.41%) and lower extremity weakness (37.50%). The lumbar spine is the most frequently affected region (62.50%), diagnosed primarily through magnetic resonance imaging (MRI) scans. Surgery, performed in 61.36% of cases, commonly involves decompressive laminectomy. Posttreatment, symptoms resolve in 87.50% of cases.

Conclusion: Cases of spinal gout present with a variety of symptoms, including back pain and weakness. Diagnosis typically involves an MRI examination and synovial fluid analysis for confirmation. Treatment varies and includes medication therapy and surgical interventions. A deeper understanding of these cases can assist healthcare practitioners in the management and diagnosis of spinal gout cases.

Keywords: Gout arthritis, monosodium urate, spine, tophi

INTRODUCTION

Gout arthritis is a chronic disease characterized by inflammatory joint inflammation, typically occurring in adults, especially men.[1] This condition arises due to the deposition of monosodium urate microcrystals in the joints and tissues, usually affecting the peripheral joints of the appendicular skeleton, particularly the feet and hands. The main symptom that typically manifests is recurrent episodes of severe pain.[2] The incidence and prevalence of gout arthritis have been increasing worldwide. Recent data estimates the prevalence of gout in Western countries to range from <1% to 6.8%, while in China, it is approximately 1.1%.[3,4] In adults, the prevalence is 3.9%, and among those aged over 80, it is as high as 9.7%.[3] In the United States, gout cases occur in nearly 4% of the entire adult population. The increasing incidence and prevalence of gout arthritis are closely linked to the rising cases of obesity and metabolic syndrome.[5] Spinal gout is a rare but significant condition

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that can impact the quality of life for patient.[6] Nevertheless, this disease is often underdiagnosed or diagnosed late due to its frequently variable symptoms, which can resemble other conditions such as disc herniation.[7] The aim of this study is to analyze cases of spinal gout, encompassing clinical features, anatomical location of spinal gout, laboratory studies, imaging studies, treatment choices, and outcomes from various cases of spinal gout.

METHODS

In this study, we conducted a comprehensive systematic review to identify and analyze cases of spinal gout over the past decade without age limitations. We identified and analyzed cases of spinal gout based on clinical features, anatomical location of spinal gout, laboratory studies, imaging studies, treatment choices, and outcomes. Our primary research question was, "How do the characteristics and outcomes of spinal gout patient case studies from the past 10 years influence understanding and decision-making in the fields of diagnosis and management?" Therefore, we aimed to provide a comprehensive insight into spinal gout. Furthermore, the findings of this study may serve as a robust foundation for decision-making in the diagnosis and management of spinal gout cases.

Data sources and literature search

We conducted a systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. To perform the systematic review, we conducted a literature search using the PUBMED and Science Direct databases. The literature search was carried out from 2013 to 2023 to ensure relevant coverage. We utilized relevant keywords such as "spinal gout," "spinal gout arthritis," "gout in the spine," and other related keywords. The search also involved appropriate Medical Subject Headings terms.

Article selection was carried out in two stages. The first stage involved selection based on titles and abstracts. The three researchers independently reviewed the title and abstract of each article, and any differences in opinions were resolved through consensus. All the literature identified from the two databases was collected and organized using the Mendeley is indeed a reference management software developed by Elsevier, headquartered in Amsterdam, Netherlands. Subsequently, a review based on the literature titles was conducted to eliminate duplicate articles. After removing duplicate articles, potential literature was reviewed based on titles and abstracts to exclude those that did not meet the inclusion criteria. We selected studies that met the following inclusion criteria: articles presenting clinical case presentations of spinal cases in adult patients and available in the English language. Studies that did not meet these criteria were excluded from the systematic review. The second stage involved a full-text review of the articles that passed the first stage.

Data extraction and quality assessment

Relevant data, including information regarding clinical features, anatomical location of spinal gout, laboratory studies, imaging studies, treatment choices, and outcomes, were extracted from the selected articles. Following the extraction of data, a descriptive analysis was undertaken. Microsoft Excel was employed for the computation of mean values, percentages, and medians, providing a comprehensive understanding of the extracted data. The results of this analysis were subsequently presented in tabular form, facilitating a clear and structured representation of the findings. Variations in study outcomes were considered and presented clearly in the research results. Furthermore, we conducted sensitivity analyses on study quality by considering only high-quality case reports. The quality evaluation was performed using the methodology and synthesis of case summaries and case reports developed by Murad *et al*.[8] The assessment encompassed the domains of selection, ascertainment, causality, and reporting for each of the studies under scrutiny.

RESULTS

Study selection and patient characteristics

A total of 100 articles were assessed to ensure the completeness of the full text after eliminating duplicates. Following the full-text review, 31 articles did not meet our inclusion criteria, ultimately leaving 69 articles in the systematic review [Figure 1]. Common reasons for exclusion included nonclinical case presentations of spinal gout. There were 63 case reports and six case series included, covering a total of 88 patients suffering from gout in the spine [Table 1]. Case articles refer to written documents that scrutinize one or two patients with spinal gout, whereas case series pertain to three or more patients experiencing a similar condition.

Patient characteristics

Out of the 88 reviewed cases of spinal gout, 79 subjects (89.77%) were male, while 9 subjects (10.23%) were female, resulting in a gender ratio of 1:8.9. The overall average age was 51.9 years (standard deviation [SD] = 17.9 years, range: 16–87 years), with females having a higher average age compared to males (62.3 vs. 50.7 years). When categorized by age groups, the highest number of subjects, 22 (25%), fell within the 60–69 age group. This was followed, in descending order, by the age groups of 40–49 years with 14 subjects (15.91%), 70–79 years with 14 subjects (15.91%), 20–29 years with 13 subjects (14.77%), 30–39 years with 11 subjects (12.5%), and

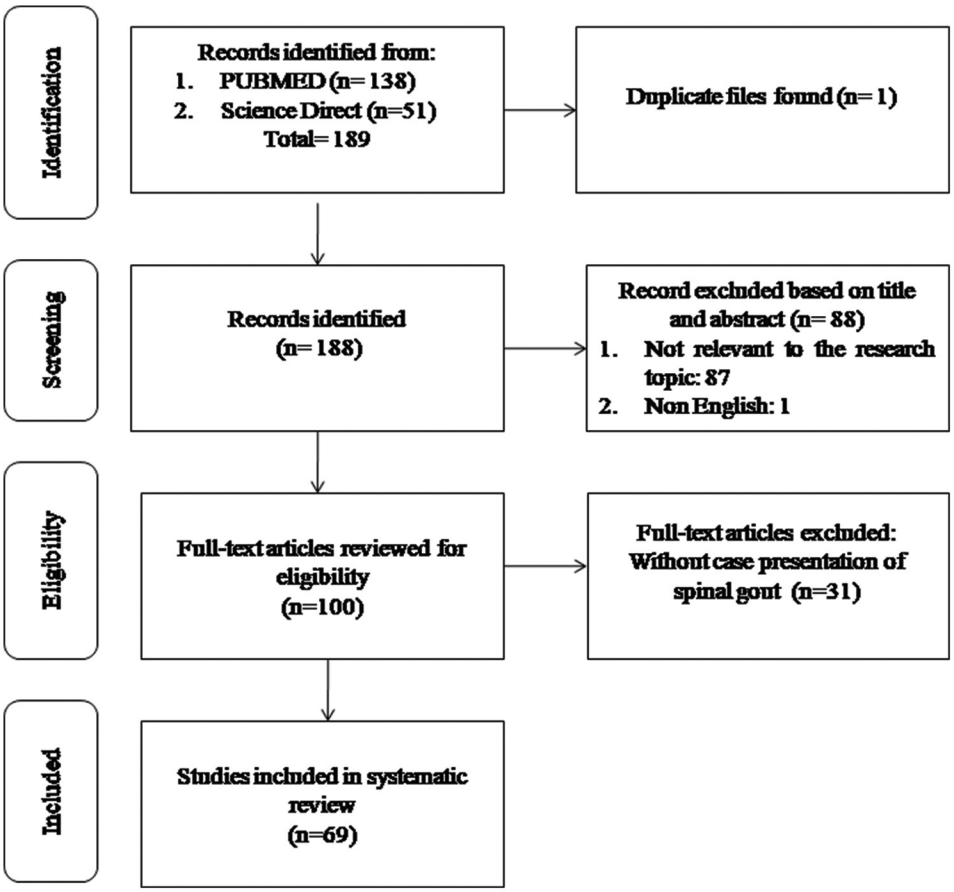

Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-analyses flow chart of the study selection process

50–59 years with 11 subjects (12.50%), over 80 years with 2 subjects (2.27%), and the lowest was the age group <20 years with 1 subject (1.14%).

Clinical presentation

Out of the 88 reviewed cases of spinal gout, the reported symptoms varied significantly. It was observed that the most common symptom was localized back/neck pain, experienced by 69 subjects (78.41%), followed by weakness in the lower limbs in 33 subjects (37.50%), numbness in 20 subjects (22.73%), fever in 19 subjects (21.59%), and 15 subjects (17.05%) presented with weakness in the upper limbs. In addition, 13 subjects (14.77%) reported urinary disturbances, 10 subjects (11.36%) exhibited weakness in the upper limbs, 9 (10.23%) subjects experienced paresthesia, 8 (9.09%) subjects encountered difficulty in ambulation, and 6 (6.82%) subjects presented with valadication, and sensory deficits. Other symptoms included lower limb pain, radiculopathy, swelling, paralysis, myelopathy, hypoaesthesia, and various other manifestations.

Furthermore, based on the location of involvement in the spine, among the 80 subjects for whom were available, it was found that the majority, 55 subjects (62.50%), had gout affecting the lumbar region, followed by 13 subjects (14.77%) in the cervical area, and 8 subjects (9.09%) in the thoracic region. Multiple-level spine involvement was observed in 4 subjects (4.55%). A total of 76 subjects (86.36%) had a history of gout. The summary of the anatomic location of spinal gout and the history of gout can be seen in Table 2.

Laboratory study

Among the 88 subjects included in the study, erythrocyte sedimentation rate (ESR) results were available for 32 subjects (36.37%). The median ESR was 64 mm/h (SD: 38.67 mm/h), with 6 subjects (6.82%) exhibiting normal results and 26 subjects (29.55%) showing elevated results. C-reactive protein data were reported for 49 subjects (55.68%), revealing that 14 subjects (15.91%) had normal levels, while 35 subjects (39.77%) demonstrated elevated levels (median: 7 mg/dL, SD: 8.91 mg/dL). Serum uric acid levels were measured in 71 subjects (80.68%), indicating elevated levels in 65 subjects (73.86%) and normal levels in 6 subjects (6.82%). The median value for serum uric acid was 558 umol/L. White blood cell count results were available for 32 subjects, with 18 subjects (20.45%) exhibiting elevated levels (median:

Table 1: Summary of publication date, author, and number of cases reported

Publication date	Author and number of cases reported	Total case
2023	Okoroafor *et al.* (1),[9] Saffarzadeh *et al.* (1),[10] Zhou *et al.* (8),[11] Li and Feng (1),[12] Jazaib Ali and Hussain (1),[13] Xian *et al.* (1)[14]	12
2022	Wang (1),[15] Chen *et al.* (1),[16] Brahmbhatt *et al.* (1),[17] Abreu Casas *et al.* (1),[18] Wang *et al.* (1),[19] Wu *et al.* (2)[20]	7
2021	Koro *et al.* (1),[21] Ayoub *et al.* (1),[22] Yip and Lee (1),[23] Thompson *et al.* (1),[24] Romero *et al.* (1),[25] Cordova *et al.* (1),[26] Karam *et al.* (1),[27] Si *et al.* (1)[28]	8
2020	Wang *et al.* (2),[29] Duarte-Salazar *et al.* (1),[30] Chen *et al.* (1),[31] Gibney and Murray (1),[32] Matos *et al.* (1),[33] Liew *et al.* (1),[34] Mishra *et al.* (1)[35], Thuraikumar *et al.* (1),[36] Kao *et al.* (1)[37]	10
2019	Liu *et al.* (1),[38] Zhou *et al.* (1),[39] Xie *et al.* (1),[40] Akhter *et al.* (1),[41] Zou *et al.* (1),[42] Wan *et al.* (1),[43] Ma *et al.* (5)[44]	11
2018	Ribeiro da Cunha *et al.* (1),[45] Al-Jebaje *et al.* (1),[46] Soon *et al.* (1),[47] Chew and Cho (1),[48] Cheng *et al.* (1),[49] Gago *et al.* (1),[50] Dwarki *et al.* (1),[51] Kaler *et al.* (1),[52] Qin *et al.* (1),[53] Ding *et al.* (1)[54]	10
2017	Wu *et al.* (1),[55] Borges *et al.* (1),[56] Ng *et al.* (2),[57] Vergara and O'Donovan (1),[58] Wang *et al.* (1),[59] Lu *et al.* (1),[60] Kim *et al.* (1),[61] Adler and Seitz (1)[62]	9
2016	Willner *et al.* (1),[63] Subrati *et al.* (1),[64] Wang *et al.* (2),[65] Elgafy *et al.* (1)[66]	5
2015	Zheng *et al.* (1),[67] Volkov *et al.* (1),[68] Au and Wood (1),[69] Liu *et al.* (1)[70]	4
2014	Nunes *et al.* (1),[71] Jegapragasan *et al.* (1),[72] Cardoso *et al.* (1),[73] Saripalli and Baskar (1),[74] Algahtani *et al.* (2)[75]	6
2013	Kwan *et al.* (1),[76] Wendling *et al.* (5)[77]	6
Total case of the study		88

Table 2: Anatomic location of spinal gout and history of gout

	n (%)
Sites	
Lumbar spine	55 (62.50)
Cervical spine	13 (14.77)
Thoracic spine	8 (9.09)
Multiple level spine involvement	4 (4.55)
NA	8 (9.09)
History of gout	
Yes	76 (86.36)
No	9 (10.23)
NA	3 (3.42)

NA - Not available

11.7 × 10^9/L). Anemia was reported in 4 subjects (4.55%), with 3 subjects (3.41%) experiencing anemia and 1 subject having normal hemoglobin levels (1.14%). The summary of laboratory study can be seen in Table 3.

Imaging modalities

Among the 88 reported cases of spinal gout, the majority utilized magnetic resonance imaging (MRI) scans, with 62 subjects (70.45%) opting for this imaging modality. Additionally, 33 subjects (37.50%) underwent computed tomography (CT) scans, 10 subjects (11.36%) received dual-energy computed tomography (DECT), and 4 subjects (4.55%) underwent X-ray imaging. Out of the total subjects who underwent MRI scans, 11 subjects (12.50%) opted for gadolinium-enhanced MRI scans.

Treatment and outcome

Among the 88 reviewed cases of spinal gout, 54 subjects (61.36%) underwent surgical treatment, with the most common procedure being decompressive laminectomy performed in 21 subjects (21.86%). Meanwhile, 31 subjects (35.23%) received conservative care. Out of the total subjects, symptom resolution after treatment was reported in 77 subjects (87.50%). Among the total subjects, 77 individuals (87.50%) reported symptom resolution after treatment. Specifically, it was observed that 35 subjects (39.77%) experienced the resolution of back pain, 12 subjects (13.64%) demonstrated neurological improvement and full strength improvement in the lower extremities, while 8 subjects (9.09%) achieved normalized uric acid levels and relief from radiation pain.

DISCUSSION

Gout arthritis is a metabolic disorder characterized by hyperuricemia resulting from decreased renal excretion or increased production of uric acid. In the chronic phase, deposits of monosodium urate crystal masses form in articular cartilage, subchondral bone, synovial membranes, and periarticular tissues, leading to tophi formation.[78] Several risk factors can contribute to hyperuricemia, including obesity, hypertension, chronic kidney disorders, alcohol consumption, high fructose or sucrose beverages, chronic kidney disease, and the use of organ transplantation or specific medications such as thiazides or loop diuretics.[52]

Gout arthritis typically affects peripheral joints of the appendicular skeleton, primarily the feet and hands.[79] In contrast, spinal gout represents a rarely reported condition.[11] This study has yielded 88 cases of spinal gout over the past decade, with the majority occurring in adults within the age range of 60–69 years. Consistent with the findings of a study conducted by Harlianto,[80] cases of spinal gout in males significantly outnumber those in female patients, with a gender ratio of 1:8.9.

Table 3: Laboratory study

Categories	*n* (%)
Elevated ESR	26 (29.55)
Elevated CRP	35 (39.77)
Elevated uric acid	65 (73.86)
Elevated of white blood	18 (20.45)
Anemia	3 (3.41)

ESR - Erythrocyte sedimentation rate; CRP - C-reactive protein

Spinal gout is a rare yet significant condition that can impact the quality of life of patients.[6] The study results reveal that the most common clinical presentation in cases of spinal gout is back or neck pain. The nature of pain in spinal gout cases bears a resemblance to pain caused by disc herniation, often leading to underdiagnosis or delayed diagnosis of the disease.[7] Furthermore, in cases of spinal gout, back pain symptoms do not always manifest, despite their frequent occurrence.[81]

Cases of gout in the spine often exhibit a predilection for specific locations. Consistent with previous studies,[66,80] in this study, the lumbar spine emerged as the most frequently affected site. In an effort to comprehend the underlying mechanisms of spinal gout, ongoing research aims to identify the factors influencing the development of gout in the spine and its relationship with clinical presentation and diagnostic outcomes. Although some studies indicate that spinal gout is more prevalent in the adult population and in those with elevated blood uric acid levels, recent research findings suggest that age and blood uric acid levels do not consistently serve as indicators of axial gout presence.[82] The presence of "peripheral tophi" or the accumulation of gout crystals in other parts of the body besides the spine, does not entirely signify the presence of spinal gout.[81,82] Therefore, it is crucial for clinicians to differentiate between spinal gout with and without peripheral tophi involvement.

It is essential to diagnose spinal gout at an early stage to prevent the progression of neurological symptoms, such as spinal stenosis or spinal cord injury. The diagnosis of gout is typically based on clinical examinations, laboratory tests, and radiological imaging results. During the clinical assessment, patients undergo physical examinations and provide their medical history. Additionally, laboratory tests, including serum uric acid measurements, and diagnostic imaging tests such as CT scans, DECT, X-rays, or MRI are commonly performed procedures. In this study, MRI was the most frequently used imaging method. Recent studies have suggested that DECT has become a promising diagnostic modality for patients with gout.[14,80] CT is a non-invasive method that can assist clinicians in measuring the levels of urate crystal deposits, aiding in diagnosing gout in patients with complex and atypical clinical presentations.[83] However, it is important to note that to confirm the diagnosis definitively, joint aspiration is often required, where synovial fluid from the symptomatic joint is collected to examine urate crystals.[2]

Clinically, the management of spinal gout relies on an accurate diagnosis. The management of spinal gout should be tailored to the patient's condition and overall situation. Education and lifestyle changes, including dietary modifications, are the first forms of intervention that can be provided to patients with spinal gout during asymptomatic periods. In the acute phase, interventions are aimed at symptom control. During this phase, conservative treatment with urate-lowering therapy and anti-inflammatory drugs such as colchicine, nonsteroidal anti-inflammatory drugs, and steroids are typically the initial choices.[84] Urate-lowering therapy, including allopurinol, febuxostat, or probenecid, is administered to prevent acute urate attacks.[43] Surgical intervention is the treatment of choice indicated when patients exhibit neurological disturbances and conservative treatment fails or symptoms do not improve. Patients without accompanying neurological deficits can be treated medically after spinal infection is managed.[72] Resection and decompression surgery are usually the first steps taken.[13]

This study aims to comprehensively review spinal gout cases from the past decade, but acknowledges several limitations. Reliance on case reports and series may introduce selection bias, focusing on unique or severe cases, potentially excluding the full spectrum of spinal gout presentations. Exclusion of non-English studies may lead to language bias, overlooking relevant cases in other languages. The lack of a standardized definition for spinal gout across studies introduces variability in case identification. Differences in diagnostic criteria, imaging techniques, and reporting standards may impact evidence consistency. Additionally, the analysis is constrained to short-term posttreatment outcomes, lacking insights into long-term effectiveness.

The review processes in this study have inherent limitations. Although the search strategy is comprehensive, it may miss non-indexed or nondatabase studies. Restricting studies to English may introduce language bias, and defined inclusion criteria might lead to selection bias. Focusing on the past decade may overlook valuable older studies, affecting historical context. The absence of meta-analysis limits the quantification of overall effects and assessment of heterogeneity. This limitation hinders robust conclusions and generalizability. The quality assessment tool, while following established methodology, may not fully capture biases in observational studies, introducing subjective elements in assessments.

In the future, there may be an increase in cases of spinal gout, primarily driven by the ongoing trends of increasing obesity and other lifestyle changes in the population.[5] Therefore, it is crucial to raise awareness about spinal gout. With heightened awareness, medical practitioners will be better equipped to identify potentially atypical cases. They will also gain a deeper understanding of patient-specific factors that can influence the diagnosis, treatment, and ultimate outcomes for this patient population.

CONCLUSION

The clinical presentation characteristics of spinal gout cases vary, with common symptoms including back pain and weakness. Diagnostic methods utilized encompass imaging examinations such as MRI and synovial fluid analysis for confirmation of the diagnosis. There is variability in treatment approaches, with some patients experiencing improvement with pharmacological therapy while others require surgical intervention. A deeper understanding of these factors may potentially provide guidance for healthcare practitioners in making decisions related to the management and diagnosis of spinal gout cases.

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Conflict of Interest

There are no conflicts of interest.

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