Gonococcal Tenosynovitis Diagnosed with the Aid of Emergency Department Bedside Ultrasound

Edward Carlin MD

Colleen Urban DO
Lehigh Valley Health Network, Colleen.Urban@lvhn.org

Jessica Sidle PA-C

Angela Cirilli MD

Jennifer Larson MD

See next page for additional authors

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Authors

Edward Carlin MD; Colleen Urban DO; Jessica Sidle PA-C; Angela Cirilli MD; Jennifer Larson MD; Mark Richman MD, MPH; and Daniel Dexeus DO

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GONOCOCCAL TENOSYNOVITIS DIAGNOSED WITH THE AID OF EMERGENCY DEPARTMENT BEDSIDE ULTRASOUND

Edward Carlin, MD,* Colleen Urban, DO,† Jessica Sidle, PA-C,‡ Angela Cirilli, MD,§ Jennifer Larson, MD,||¶ Mark Richman, MD, MPH,‡ and Daniel Dexeus, DO‡

*Department of Emergency Medicine, Northwell Health North Shore University Hospital, Manhasset, New York, †Department of Emergency Medicine, Lehigh Valley Health Network, Allentown, Pennsylvania, ‡Department of Emergency Medicine, Northwell Health Long Island Jewish Medical Center, New Hyde Park, New York, §Emergency Ultrasound, Department of Emergency Medicine, St. John's Riverside Hospital, Yonkers, New York, ||Northwell Health Department of Emergency Medicine, New Hyde Park, New York, and ¶Northwell Health Department of Internal Medicine, New Hyde Park, New York

Reprint Address: Mark Richman, MD, MPH, Department of Emergency Medicine, Long Island Jewish Medical Center, 270-05 76th Avenue, New Hyde Park, NY 11040

☐ **Abstract—Background: Gonorrhea is the second most common sexually transmitted infection. Disseminated gonococcal infection (DGI) consists of gonococcal infection plus one or more of the triad of arthritis, tenosynovitis, and dermatitis. Diagnosis in the emergency department (ED) must be suspected clinically, as confirmatory tests are often not available. Point-of-care ultrasound (POCUS) can aid in diagnosis and appropriate management by identifying tenosynovitis and excluding arthritis. Case Report: A 26-year-old man with multiple recent sex partners presented to the ED with slowly progressing right wrist pain and swelling over 5 days. His dorsal right wrist was swollen, with slightly decreased range of motion owing to mild pain, and no warmth, tenderness, erythema, or drainage. Multiple hemorrhagic, gray-purple blisters were noted over both hands. Serum white blood cell count was 12 × $10^3/\mu$L; C-reactive protein was 30.3 mg/L. POCUS of the dorsal right wrist found no joint effusion; the extensor tendon sheath contained a large anechoic space with clear separation of the extensor tendons, suggesting a tendon sheath effusion/tenosynovitis. DGI was suspected, without septic arthritis. The patient was admitted and treated with ceftriaxone and azithromycin. Gonococcus grew from blood cultures and pharyngeal swabs. Why Should an Emergency Physician Be Aware of This?: DGI must be suspected clinically, as confirmatory tests are often not available in the ED. Not all patients present with arthritis, tenosynovitis, and dermatitis. It is often difficult to differentiate tenosynovitis from arthritis. POCUS can aid in diagnosis by identifying tenosynovitis (vs. arthritis or simple soft-tissue swelling), allowing timely appropriate DGI diagnosis and management, and, importantly, averting unnecessary arthrocentesis.** © **2018 Elsevier Inc. All rights reserved.**

☐ **Keywords—gonorrhea; disseminated gonorrhea; disseminated gonococcal infection; tenosynovitis; POCUS; point-of-care ultrasound**

INTRODUCTION

Gonorrhea is the second most common sexually transmitted infection in the United States. Disseminated gonococcal infection (DGI) complicates 1–2% of patients with gonorrhea and presents with one or more of the triad of arthritis (3/4 of patients), tenosynovitis (2/3 of patients), and dermatitis (1–3). Early diagnosis is important, as gonococcus can additionally cause endocarditis, meningitis, and death (4). In this case report, early diagnosis was aided by point-of-care ultrasound (POCUS), which led to appropriate diagnosis and, importantly, averted unnecessary arthrocentesis.

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CASE REPORT

A 26-year-old man presented to the Emergency Department (ED) with slowly progressing right wrist pain and swelling over the previous 5 days. He also reported multiple blood blisters on both hands that began a few days after the wrist started to swell. He denied trauma, fevers, chills, dysuria, urethral discharge, or genital sores. He had no past medical or surgical history and took no medications. He lives in the northeastern United States and traveled to the Bahamas 1 month prior to presentation, but could not recall any insect bites. The patient reported having two current female sexual partners, 8–10 partners within the last year, and inconsistent condom use. He never smoked cigarettes, but used alcohol two to three times per week and marijuana monthly. There was no family history of gout, rheumatoid arthritis, lupus, or other autoimmune disease.

ED vital signs were: oral temperature 37.1°C (98.8°F), heart rate 80 beats/min, blood pressure 118/74 mm Hg, respiratory rate 18 breaths/min, and room air oxygen saturation 99%. He was well-appearing and in no apparent distress. His right wrist demonstrated dorsal swelling, with slightly decreased range of motion owing to mild pain, and no warmth, tenderness, erythema, or drainage; the flexor surface was normal. Multiple hemorrhagic, gray-purple blisters were noted over both hands (Figures 1 and 2). Cardiac, pulmonary, abdominal, and neurologic examinations were unremarkable. There were no genital lesions, penile discharge, or testicular abnormalities.

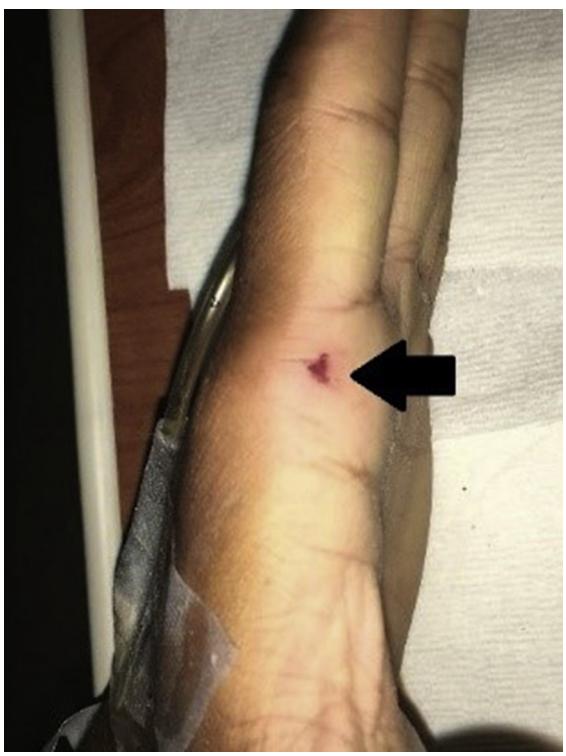

Figure 1. Healing, hemorrhagic, gray-purple blisters visualized on both hands. Photo taken 3 days after presentation to the Emergency Department.

Figure 2. Healing, hemorrhagic, gray-purple blisters visualized on both hands. Photo taken 3 days after presentation to the Emergency Department.

Laboratory analysis was significant for a serum white blood cell count of $12 \times 10^3/\mu L$, erythrocyte sedimentation rate of 19 mm/h, C-reactive protein of 30.3 mg/L, and uric acid of 5.5 mg/dL. The right wrist radiograph and comprehensive metabolic panel were unremarkable.

Sonographic evaluation of the patient's dorsal right wrist was performed, using a Zonare Z.One Pro system (ZONARE Medical Systems, Inc. Mountain View, California) and a high frequency (10-MHz) linear transducer (Zonare L10-5 array). Although no joint effusion was identified, the extensor tendon sheath contained a large anechoic space with clear separation of the extensor tendons, suggesting a tendon sheath effusion (Figure 3A, B). Color Doppler imaging of the tendon sheath revealed no significant flow within the sheath; however, there was increased signal in the surrounding tissue, indicating hyperemia (Figure 3C, D). These findings suggested extensor tenosynovitis.

The combination of hemorrhagic blisters, with physical examination and ultrasound findings of tenosynovitis, raised suspicion for DGI. The patient was admitted to the hospital for intravenous ceftriaxone and azithromycin. Blood and pharyngeal cultures grew Gram-negative diplococci consistent with *Neisseria gonorrhoeae*; the species was sensitive to all antibiotics tested. Human immunodeficiency virus (HIV), rapid plasma reagin, and urine chlamydia and gonorrhea amplification studies

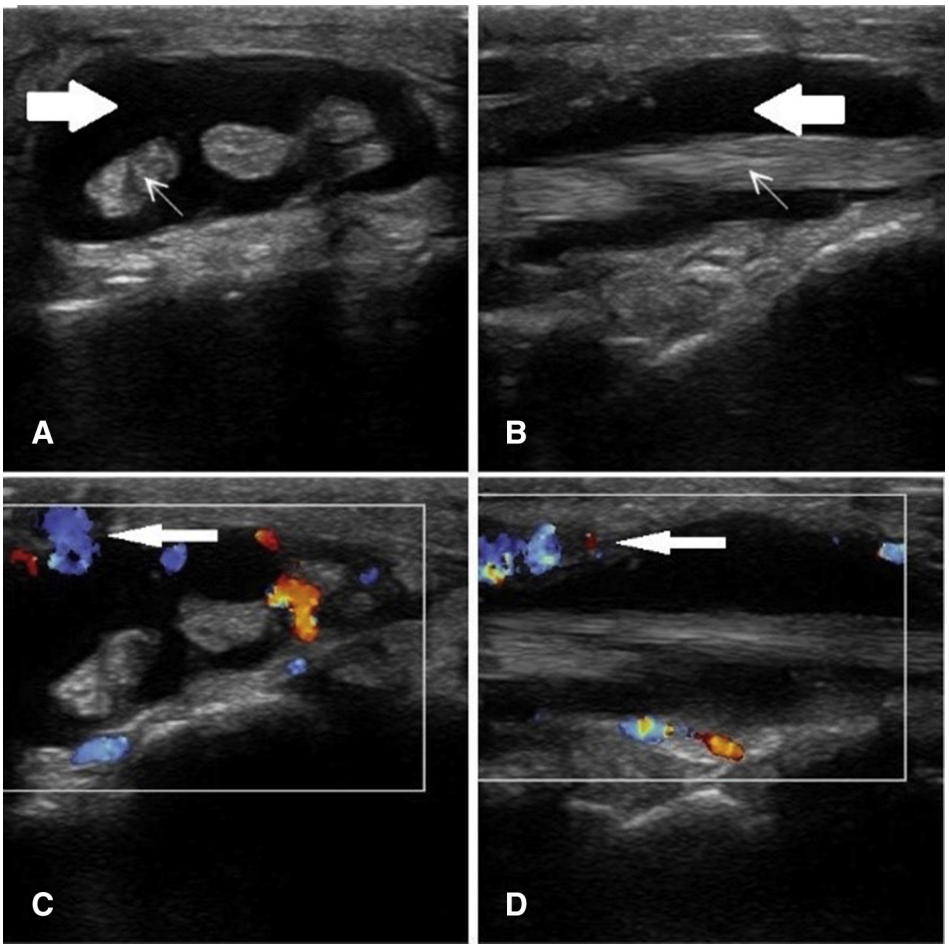

Figure 3. Ultrasonographic images of the patient's dorsal right wrist using a linear probe (L10-5 probe using the Zonare Z.One Pro Ultrasound System): (A) Transverse view of the dorsal wrist detailing the extensor tendons (small arrow) surrounded by fluid (large arrow) within the tendon sheath. (B) Longitudinal view of the dorsal wrist detailing a tendon (small arrow) bathed in fluid (large arrow) within the tendon sheath. Color Doppler in both transverse (C) and longitudinal (D) orientations highlights areas of increased flow in the surrounding tissue (arrows), but is largely absent in the tendon sheath effusion.

were negative, as was a rectal swab culture. A hand specialist advised against wrist fluid sampling because, in the absence of warmth, redness, or tenderness, his tenosynovitis was most likely a reactive, minor inflammatory effusion, with no suspicion for septic joint. He improved on ceftriaxone and was discharged on day 2 with a peripherally inserted central catheter line.

DISCUSSION

Gonorrhea is the second most common sexually transmitted infection in the United States, peaking in the early teens in women and early 20s in men; in 2015, 50% of cases were in persons 15–24 years old (5,6). More women than men are infected, and prevalence is almost 10 times higher in Black than White patients. Dissemination occurs in 1–2% of patients (1,2). The incubation period is 3–5 days. At least 50% of women with gonorrhea are asymptomatic, allowing bacteria to spread prior to symptoms. Men often experience symptoms (typically urethritis) (4).

DGI is associated with a strain causing bacteremia without urogenital symptoms, and usually manifests with fever, chills, and the triad of the Arthritis-Dermatitis syndrome (3,4):

1. Arthritis: An asymmetric, migratory, often-septic polyarthritis of the knees, wrists, ankles, and finger joints develops in 3/4 of patients.
2. Tenosynovitis develops in 2/3 of patients, predominantly of the hand and wrist extensor tendons.
3. Dermatitis, manifesting as petechial or pustular acral lesions.

Diagnosis

Laboratory studies. N. gonorrhoeae is a Gram-negative, intracellular, aerobic diplococcus (7). Diagnosis is made through culture and nonculture tests (nucleic acid

amplification tests, polymerase chain reaction, DNA probes, and Gram stain). Nonculture tests do not provide antibiotic sensitivities. Positive samples should be reported to the public health department. Regardless of symptoms, in men the urethra, pharynx, and rectum should be swabbed; in women, the cervix, pharynx, and rectum should be swabbed (8). When cultures are sent, the laboratory should be made aware that gonococcal infection is suspected so they can use Thayer-Martin media. Fluid aspiration of swollen tendon sheaths or joints is not necessary in every patient, but should be performed when septic tenosynovitis or arthritis is suspected on the basis of clinical examination (e.g., marked pain, erythema, warmth, or limited range of motion) or significantly elevated inflammatory markers (e.g., serum white blood count, erythrocyte sedimentation rate, or C-reactive protein). The mean synovial fluid leukocyte count in gonococcal arthritis is typically around 50,000 cells/mm^3; in some cases, cell counts below 10,000 cells/mm^3 may be observed (9). All persons with a diagnosis of gonorrhea should be tested for other sexually transmitted infections, including chlamydia trachomatis, syphilis, and HIV (4).

Imaging. POCUS can distinguish between cellulitis, abscess, joint effusions, tenosynovitis, and tendon sheath effusions, detecting small joint effusions with a sensitivity and specificity up to 74.3% and 97.5%, respectively, compared with magnetic resonance imaging (10,11). Research on reactive inflammatory responses has found ultrasound even more sensitive than magnetic resonance imaging in detecting tenosynovitis (12). POCUS can distinguish between transudative synovitis (anechoic) and exudative synovitis (hyperechoic, due to crystals, fibrous material, pus, blood clots, or debris). Dynamic maneuvers facilitate differentiation between exudative and proliferative tenosynovitis (hypertrophy of the synovium, such as from chronic rheumatologic conditions) (13). Less research has been carried out on patients with infectious processes; however, case reports and case series describe several instances of tendon sheath effusions and tenosynovitis seen on ultrasound, with sensitivities approaching 90% compared with the gold standard of surgical drainage (2,14–18). In our patient, the clearly defined tendons, surrounded by anechoic space, suggest marked tendon sheath effusion. This, coupled with the increased flow in the surrounding tissue seen on color Doppler imaging, was highly suggestive of extensor tenosynovitis. As gonococcal diagnostic test results often are not available in the ED, POCUS can play a valuable role in raising suspicion for DGI and excluding joint infection, as in this case.

Differential diagnosis. The differential diagnoses for DGI include a broad array of infectious and rheumatologic conditions, including nongonococcal septic arthritis, reactive arthritis, rheumatic fever, syphilis, meningococcemia, cryoglobulinemia, bacterial endocarditis, and lupus (19).

Treatment

Patients should receive ceftriaxone 1 gram i.v. every 24 h and azithromycin 1 gram (due to common co-infection with *Chlamydia trachomatis*) orally in a single dose (20,21). Recent increased resistance to fluoroquinolones (22.3% in 2015) and cefixime has left dual therapy with ceftriaxone and azithromycin as the only Centers for Disease Control and Prevention-recommended treatment for gonorrhea (22). An alternative regimen is cefotaxime 1 gram i.v. every 8 h or ceftizoxime 1 gram i.v. every 8 h and azithromycin 1 gram orally in a single dose. Those anaphylactic to cephalosporins should receive a single 2-gram dose of azithromycin orally (21). Sexual partners within 60 days prior to the onset of symptoms, or the most recent sexual partner, should be notified for evaluation, testing, and treatment.

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

DGI is an uncommon condition requiring substantial clinical suspicion for diagnosis. In addition, providers must consider a long list of alternate conditions among the differential diagnosis. As in this case, POCUS can facilitate earlier diagnosis, and, by localizing swelling to the tendon sheath rather than joint space, avert unnecessary procedures such as arthrocentesis.

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