

CASE REPORT

Pediatrics

A toddler with transient synovitis and COVID-19 infection

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m.gausche-hill@lundquist.org**Funding and support:** By JACEP Open policy, all authors are required to disclose any and all commercial, financial, and other relationships in any way related to the subject of this article as per ICMJE conflict of interest guidelines (see www.icmje.org). The authors have stated that no such relationships exist**Abstract**

Transient synovitis of the hip is a common medical emergency in children. Although reactive arthritis in adults may occur 1–4 weeks after COVID-19 infection or post-vaccination, few reports of transient synovitis in children associated with acute COVID-19 infection have been made. Transient synovitis of the hip occurs most frequently in children 3–8 years of age with a recent upper respiratory infection, bacterial infection, or trauma. This case report presents a unique case of an otherwise healthy 15-month-old girl with right hip pain and the refusal to ambulate associated with COVID-19 infection.

KEYWORDS

COVID-19, immunizations, reactive arthritis, transient synovitis

1 | INTRODUCTION

Transient synovitis (TS) of the hip is a common, self-limited condition in children, typically occurring between the ages of 3 and 8 years.^{1,2} Although the exact cause is still debated, the condition involves non-specific inflammation affecting the synovial membrane of the hip joint, resulting in effusion.^{3,4} Classic manifestations include transient acute unilateral hip or groin pain, limp, refusal to bear weight, limited range of motion, referred pain to the knee, and/or tenderness to palpation.^{2,4} About 70% of patients with TS report an antecedent upper respiratory infection (URI) prior to symptom onset, but other infections such as pharyngitis, bronchitis, or otitis media have been reported to cause TS.²

While TS is associated with bacterial infections, viral infections, and immunization, there are few case reports linking COVID-19 as a cause

in children and Bradley et al, reported no increase in TS cases during the COVID-19 pandemic.⁵ The present case will describe an otherwise healthy patient with a history of three vaccinations (pneumococcal polysaccharide vaccine [PPSV] 23; influenza; and diphtheria, tetanus, and acellular pertussis [DTaP]), which she received 2 days prior to the onset of symptoms. Upon presentation, the patient was afebrile with normal vital signs and refused to bear weight. She had no preceding URI, bacterial infections, or trauma. After a thorough history and clinical examination, the patient was diagnosed with TS associated with COVID-19 infection.

2 | CASE

A 15-month-old girl presented to the emergency department (ED) with a primary complaint of leg pain and limp on the right leg, of such severity the child crawled instead of bearing weight. One day prior to the

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onset of symptoms, she visited her pediatrician and received three scheduled vaccines (PPSV 23, influenza, and DTaP), two on her left thigh and one on the right. The mother reported that her daughter had decrease in oral intake, refusal to ambulate, and increased crying. The mother reportedly denied a measured fever but reported tactile fever 3 days prior to ED visit. Otherwise, the mother noted the patient had been healthy with no significant illnesses. Mother denied her daughter had vomiting, diarrhea, skin rash, or recent URI. Furthermore, the patient lived in a safe home environment without concern for abuse or accidental secondary trauma. Family history revealed that the father was ill with URI but other family members were well. The parents denied giving their child medication since onset of symptoms.

On physical examination, the child was well appearing, alert, and in no acute distress. Her vitals were as follows: heart rate, 139 beats per minute; respiratory rate, 24 breaths per minute; blood pressure, 116/77 mm Hg; temperature 37.2°C, and oxygen saturation, 98% on room air. The patient's head, neck, respiratory, skin, cardiovascular, genitourinary, and gastrointestinal examinations were unremarkable. The musculoskeletal examination showed no skin edema, erythema or rash and normal range of motion, bilateral knees, ankles, and feet but was noted to have minimal tenderness on palpation of bilateral thighs. On range of motion, the right hip was painful as compared to the left and abduction was limited on the right.

The patient was given ibuprofen with no improvement in ambulation status. On re-examination, the patient had significant pain on movement of the right hip. The differential diagnosis included transient synovitis, septic arthritis, cellulitis, abscess, and myositis, among other musculoskeletal diseases.

An Anterior-posterior (AP) pelvis x-ray and laterals of both hips showed no evidence of fracture, Legg–Calve–Perthes disease, dysplasia, or osteomyelitis. Ultrasound revealed right hip joint effusion (Figure 1A) and left hip was normal (Figure 1B). Lab work showed leukocyte count of 6.8 K/cumm, erythrocyte sedimentation rate of 14 mm/h, and C-reactive protein of 0.91 mg/dL, all of which were within normal limits. A COVID-19 polymerase chain reaction (PCR) test was positive. On further re-examination, the patient limped but was now able to bear weight. Due to no significant overlying skin findings, known viral exposure, and results from imaging and laboratory studies, TS was the most likely diagnosis.

The patient's family was counseled on following up with their primary care physician for recheck and to return to the ED if the patient developed a high fever, skin color changes, redness, or further refusal to bear weight. Phone follow-up the next day revealed improvement in symptoms and ambulation without progression of symptoms.

3 | DISCUSSION

This case report illustrates the challenges with delineating the cause of limp or refusal to bear weight in children. The medical decision in this case was whether the patient's symptoms were due to immunization adverse events or other hip pathology, such as TS or septic arthritis.

The onset of refusal to bear weight is uncommon finding post-vaccination. Typically, immunization-related side effects include fever, soreness, muscle pain, warmth, erythema, and hardening at injection site.⁶⁻⁹ Rarely with DTaP, swelling of the entire arm and leg may occur, none of which were present in our patient.⁷ Few studies have reported the rare phenomenon of arthritis following childhood immunizations. Thompson et al. reported 40 patients who developed arthritis after receiving the HPV-77-DK 12 rubella vaccine.¹⁰ Rahimi et al reported a case of a 10-day-old female child who presented with inflammatory arthritis following a hepatitis B vaccine. Patient complaints included a decrease in right lower extremity movement and right knee swelling.¹¹ Additionally, Miller et al assessed the likelihood of an association between Measles, mumps and rubella vaccine (MMR) and gait disturbances, including children who were less than 24 months to 12 years old. The study examined records of children who received the MMR vaccine and assessed for an increase in gait disturbances over 60 days post-vaccination. No increase was found for children who were then seen by general practitioners or at a hospital. The scarcity of documented cases of synovitis post childhood immunizations further emphasizes the rarity of a joint effusion as a potential side effect of vaccination.¹²

Woo et al reported 79 patients with extensive limb swelling after receiving multiple vaccines or in multiple limbs. In 72 of 79 cases, extensive limb swelling included only one swollen limb after multiple vaccine injections. Reports of limb swelling occurred within 1 day post-vaccination in 89% of cases from all ages. Finally, there were no reports of joint effusions or synovitis in any of these patient cases.¹³

Our patient had no previous medical history to warrant receiving PPSV23 vaccine, which is not typically given to healthy children under 2 years of age. Nonetheless, the reported side effects of PPSV23 do not coincide with the patient's signs and symptoms. We acknowledge that the administration of three vaccines 2 days prior to the ED visit offers the plausibility of discomfort causing limping. However, a multitude of features of the history and physical could not be explained by a simple muscular local reaction. History revealed symptoms prior to vaccination with sick contacts in the family. The well appearing afebrile child's refusal to walk (rather than thigh discomfort) with the presence of a hip effusion suggested the diagnosis of TS. The only known cofactor was the presence of COVID-19 infection, as defined by compatible symptoms with a positive test.

Investigators have reported reactive arthritis in adult patients associated with COVID-19, but few reports describe similar finding in young children, especially infants and toddlers.¹⁴ Sinaei et al reported two cases of post-COVID reactive arthritis in an 8-year-old male child and 6-year-old female child living in Kerman, Iran. Both children complained of a limp, fever, and mild URI 1 week prior to developing joint effusion. Management for both cases was with rest and non-steroidal anti-inflammatory drugs.¹⁶ A report by Bradley et al described a 10-year-old male child with TS associated with COVID-19, who exhibited URI symptoms prior to the onset of reactive arthritis.⁵ While both the 15-month-old female child in our case and the 10-year-old male child in the referenced report had COVID-19 associated with TS, what distinguishes our case is the minimal signs or symptoms before the onset of a

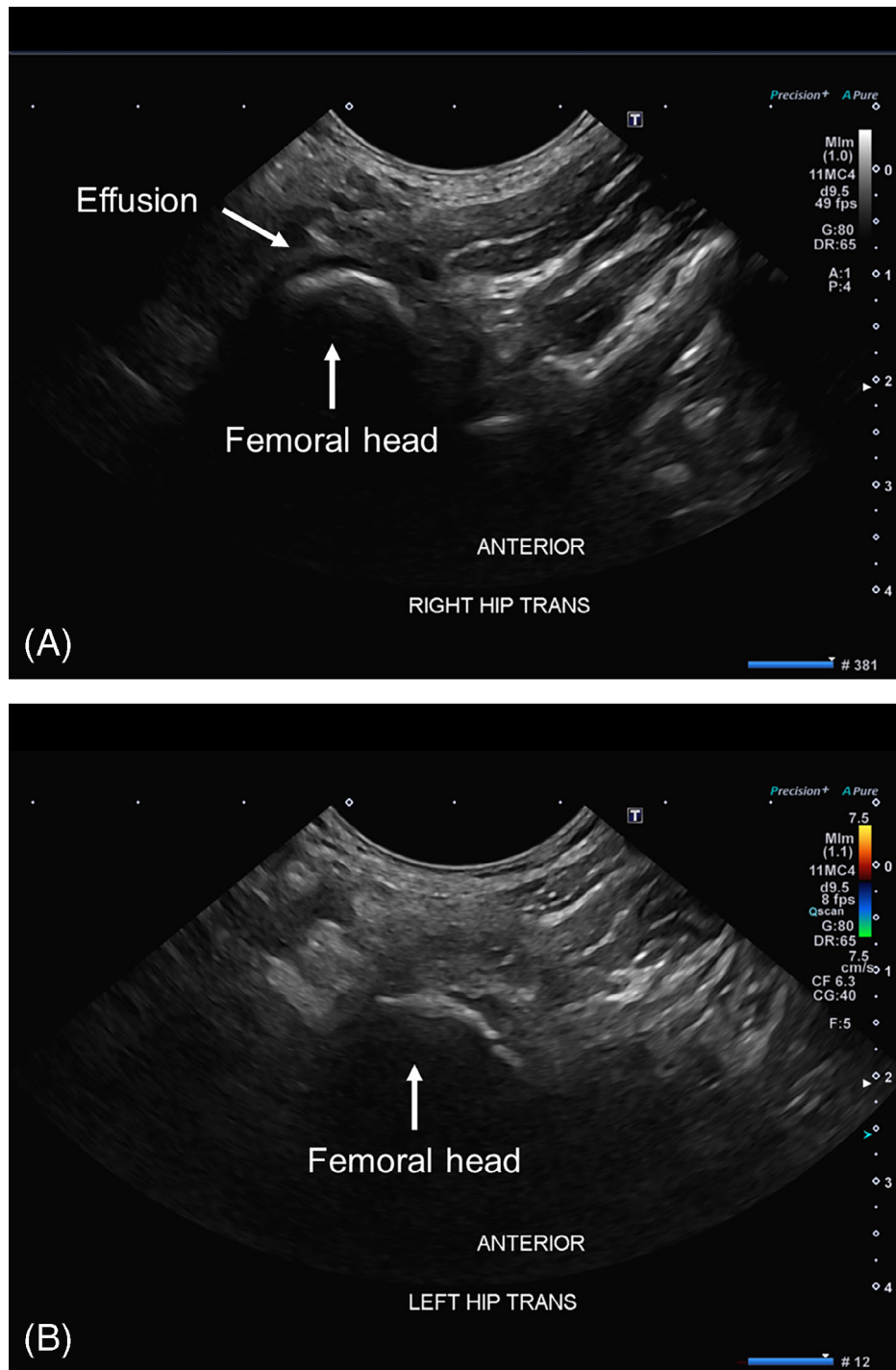


FIGURE 1 Ultrasound of bilateral hips demonstrating a small effusion on right hip (A) and normal left hip (B).

limp and the young age of our patient compared to previous reports of COVID-19-associated TS.

Finally with any young child with limp, one must consider whether the case presentation is concerning for septic arthritis. Kocher et al postulated criteria for determining if a child with a limp was at risk for septic arthritis. These criteria included a history of fever, non-weight-bearing, an erythrocyte sedimentation rate of greater than 40 mm/h, and a serum white blood cell count of greater than 12,000


cells/mm³.^{17,18} Although our patient at presentation was non-weight-bearing which brought concern and prompted the laboratory and ultrasound evaluation, on re-examination at time of discharge she was able to bear weight and her laboratory studies were normal. Thus, her Kocher score was zero suggesting a less than 0.2% chance for septic arthritis. With this said, the usefulness of these criteria have been questioned and must be put into context of history, physical findings, and time course of signs and symptoms.^{19,20} In our case, the patient's

minimal symptoms, which improved with ibuprofen, suggested a less concerning etiology of TS.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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