Unusual Teenage Growing Pains: If the Genes Fit

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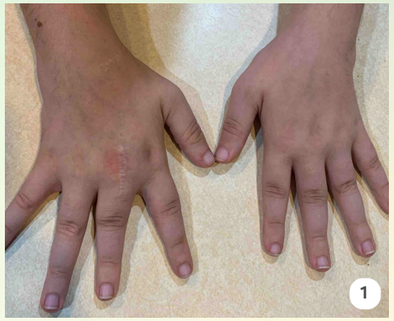
Case Presentation

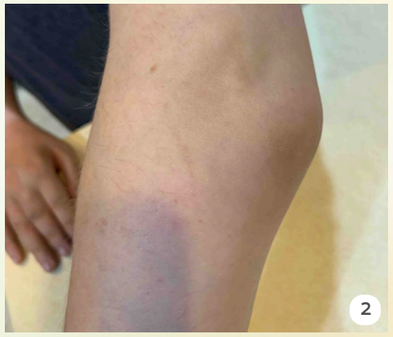
The patient is an 18-year-old male who presents to the office for an evaluation of joint pain. His past medical history includes ADD, Asperger's, and OSA on CPAP. At age 16, he developed pain and swelling of his right hand after catching a football. He then developed a mass in that area which was mobile. He went to a hand surgeon and had it removed; but did not know the pathology results. Following surgery, he began to have pain in several joints including left elbow, bilateral wrists, bilateral knees, bilateral ankles, toes and fingers. He admits to his joints becoming erythematous and swelling. He has had fluid removed from his knee by orthopedics before, WBC count was 18,850. His pains have been treated with naproxen in the past with minimal improvement. Pain is worst in the morning and is associated with stiffness and improves with activity. He has a family history of psoriasis, rheumatoid arthritis and gout.

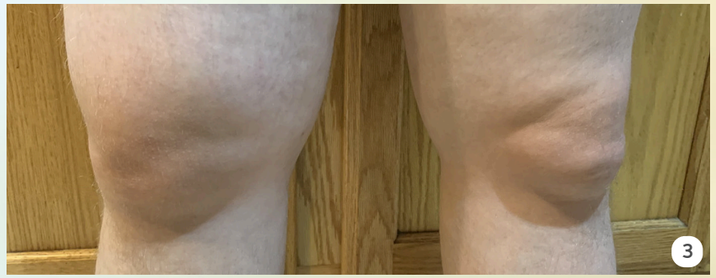
Physical examination reveals tachycardia, normal cardiopulmonary examination, but musculoskeletal exam reveals limited range of motion of bilateral elbows, surgical scar over 3rd right MCP, large subcutaneous nodule overlying left knee, audible crepitus bilateral knees and left ankle with mild swelling and warmth overlying the lateral malleolus (Figs 1-3). Patient was sent for laboratory work up; results are in Table 1 which most notably reveals a significantly elevated uric acid. Patient was additionally sent for x-ray evaluation showing severe erosive changes in the carpal bones, carpometacarpals, and his right 3rd MCP (Figs 4, 5), as well as a large erosion of the proximal olecranon measuring 2.2 x 1.3 cm (Fig 6).

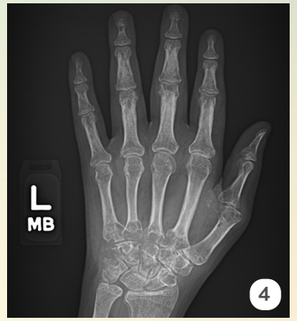
TABLE 1

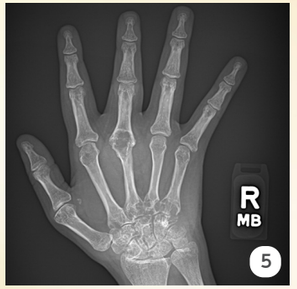
LAB TEST	VALUE (REFERENCE RANGE)
Hemoglobin	11.9 (12.5-17.0 g/dL)
WBC	11.4 (4-10.5 thou/cmm)
Platelet count	511 (140-350 thou/cmm)
Creatinine	1.31 (0.53-1.30 mg/dL)
Calcium	11.7 (8.5-10.1 mg/dL)
Albumin	4.0 (3.5-4.8 g/dL)
Alkaline phosphatase	133 (35-120 U/L)
AST	32 (<41 U/L)
ALT	75 (<56 U/L)
CCP	<3.0 (<6.0 RU/mL)
RF	<10 (<15 IU/mL)
ANA	Absent
C-reactive protein	39.2 (<7.0 mg/L)
ESR	79 (0-15mm/hr)
Lyme serologies	Negative
HLA B27	Negative
Uric Acid	16.7 (3.5-7.0mg/dL)

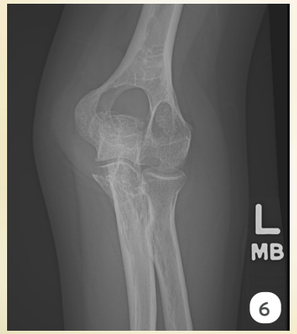












Diagnosis and Management

The patient was confirmed to have gout. Records obtained from other facilities confirmed a tophus on pathology and monosodium urate intracellular crystals from his prior knee arthrocentesis. Due to patient's young age, he was referred for genetic counseling. After evaluation, due to his gout, mild muscle weakness, and Asperger's syndrome, he underwent testing of the PRPS1 gene. He was found to have a variant of unknown significance (VUS) of the PRPS1 gene on the X chromosome.

Patient was started on colchicine and allopurinol (200mg). Uric acid improved to 6.8 and inflammatory markers normalized but he developed worsening transaminitis and his allopurinol dose was reduced to 100mg. Due to persistent elevation in liver enzymes, allopurinol was discontinued. The patient continued to have synovitis and large painful tophi. A G6PD was checked and was negative. Patient was started on methotrexate and authorized for pegloticase and is currently receiving treatment, however he has been having mild reactions and may need to try alternate therapies. He will undergo close monitoring of his joints for stability during treatment, particularly the left elbow, given his large erosion. He may need orthopedic intervention in the future.

Discussion

Gout in a teenager is exceedingly rare and is typically the result of a genetic mutation. In our patient, an unclear variant of the phosphoribosylpyrophosphate synthetase-1 gene was detected. Mutations of PRPS1 cause super activity of the PRPP synthetase enzyme which causes hyperuricemia and hyperuricosuria. There is a severe phenotype with infantile or early childhood onset which can lead to intellectual disability, and a milder, late-juvenile/early adult onset. This is inherited in an X-linked fashion, and familial genetic counseling is advised. Treatment of gout with urate lowering therapy is recommended but does not affect other aspects of the disorder.

REFERENCES

de Brouwer, A. P. M., van Bokhoven, H., Nabuurs, S. B., Arts, W. F., Christodoulou, J., & Duley, J. (2010). PRPS1 mutations: Four distinct syndromes and potential treatment. *The American Journal of Human Genetics*, 86(4), 506–518. https://doi.org/10.1016/j.ajhg.2010.02.024

Yang, B.-Y., Yu, H.-X., Min, J., & Song, X.-X. (2019). A novel mutation in gene of PRPS1 in a young Chinese woman with X-linked gout: A case report and review of the literature. *Clinical Rheumatology*, 39(3), 949–956. https://doi.org/10.1007/s10067-019-04801-0

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