Beware the Runny Nose – Could Be CSF Leak!

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Abstract
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#16. Suddenly Stuck: A Classic Case of Thyrotoxicosis Periodic Paralysis

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**Mentor:** Rae Witt

**Program:** Internal Medicine

**Type:** Case Report

**Background:** Thyrotoxic Periodic Paralysis is an uncommon syndrome that can present as temporary weakness or paralysis, secondary to hypokalemia predisposed by a thyrotoxic state.

**Case:** A 40-year-old man presented with progressively worsening, diffuse body weakness that had begun the day prior. He also noted unintended weight loss of 45 lbs over the prior 6 months, palpitations, and increased fatigue with low levels of exertion. On presentation, he was in atrial fibrillation with rapid ventricular response. He had a diffusely enlarged thyroid that was tender to palpation. Muscle strength was 3/5 in proximal lower extremities bilaterally and 4/5 in proximal upper extremities bilaterally. Evaluation was significant for low potassium (2.3 mEq/L), undetectable thyroid stimulating hormone (TSH) (<0.01 mIU/L), and elevated Free T4 (3.5 µg/dL). Thyroid was enlarged and heterogeneous by ultrasound. Subsequent TSH receptor antibody was elevated (26 IU/L), consistent with Graves’ disease. The patient was started on propylthiouracil and propranolol for the management of thyrotoxicosis, and potassium was repleted. He experienced quick resolution of his diffuse body weakness and was stabilized for discharge with close follow-up.

**Conclusion:** This case represents the clinical presentation of Thyrotoxic Periodic Paralysis, a syndrome that can present with painless muscle weakness or paralysis secondary to thyrotoxicosis. Pathophysiology is suspected to be secondary to excess thyroid hormone driving the sodium-potassium pump, transporting potassium into cells, and impairing the electrical function of skeletal muscle. It can be managed by treating the underlying thyrotoxicosis while repleting potassium. Importantly, potassium needs to be repleted cautiously as patients are at risk for rebound hyperkalemia.

#17. Comparison of Injuries Sustained on Grass and Artificial Turf by USL1 Men’s Soccer Team. Part 1: Match Related Injuries

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**Mentor:** Michael Osterholt

**Program:** Family Medicine – Primary Care Sports Medicine

**Type:** Original Research

**Background:** Athlete health and safety on artificial turf (AT) is a topic for debate. This study aims to analyze and compare the incidence, type, and location of injuries sustained on AT and natural grass (NG) for matches of a United Soccer League, League 1 (USL1) men’s soccer team.

**Methods:** Playing surface, player hours and injury data including anatomic location of injury, and type of injury sustained were retrospectively reviewed for matches of three USL1 seasons (2020-2022). Injury incidence rates were reported in terms of number of injuries per 1000 player hours.

**Results:** Three-year cumulative match data resulted in 428 exposure hours and 69 injuries on AT versus 1085 hours and 175 injuries on NG. Overall incidence of match related injuries per 1000 player hours was 161.26 on AT compared to an identical 161.26 on NG (Incidence Ratio (IR)=1.00; P Value<1.00). Lower limb was the most common injury location on AT and NG with an incidence of 112.18 and 118.87 respectively (IR=0.94, P Value<0.193), Contusion (IR=0.39, P<0.001), Fracture/Bone Stress (IR=0.47, P<0.317), Upper limb (IR=0.43, P<0.030), Trunk (IR=0.84, P<0.520), and Lower limb (IR=0.76, P<0.004). Muscle/tendon and contusion injuries on AT were 67.78 and 44.41 respectively, compared to 57.13 and 60.82 on NG (IR ratio muscle/tendon=1.16, P<0.447) (IR contusion=0.73; P<0.227).

**Conclusion:** There was no statistically significant difference of match related injuries sustained on AT and NG per 1000 player hours of a USL1 men’s soccer team when comparing overall incidence, location and type of injury.

#18. Comparison of Injuries Sustained on Grass and Artificial Turf by USL1 Men’s Soccer Team. Part 2: Total Athlete Exposure

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**Mentor:** Jason Meredith

**Program:** Family Medicine – Primary Care Sports Medicine

**Type:** Original Research

**Background:** Athlete safety on artificial turf (AT) is a topic for debate. This study aims to analyze and compare the incidence, type, and location of injuries sustained on AT and natural grass (NG) playing surfaces for a United Soccer League, League 1 (USL1) men’s soccer team.

**Methods:** Playing surface, athlete exposure and injury data including anatomic location of injury, and type of injury sustained were retrospectively reviewed for three USL1 seasons (2020-2022). Injury incidence rates were reported in terms of number of injuries per 1000 athlete exposures.

**Results:** There were 3444 exposures on NG and 5550 on AT over the 3-year period. 295 injuries were registered on AT versus 259 on NG. Overall incidence of injuries per 1000 exposures was 53.15 on AT compared to 75.20 on NG (Incidence Ratio (IR)=0.71, P Value<0.001). Subgroups for location of injury comparing incident rate on AT to NG: Head/neck (IR=0.38, P<0.002), Upper limb (IR=0.43, P<0.030), Trunk (IR=0.84, P<0.520), and Lower limb (IR=0.76, P<0.004). Subgroups for type of injury comparing incident rate on AT to NG: Fracture/Bone Stress (IR=0.47, P<0.317), Joint (non-bone)/Ligament/Cartilage (IR=1.06, P<0.771), Muscle/Tendon (IR=0.85, P<0.193), Contusion (IR=0.39, P<0.001),
#21. Beware the Runny Nose – Could Be CSF Leak!

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**Mentor:** Sarah Howard

**Program:** Clarkson Family Medicine

**Type:** Case Report

**Background:** Cerebrospinal fluid (CSF) rhinorrhea is a rare condition in which cerebrospinal fluid leaks from the nasal cavity. It can be caused by trauma, surgery, congenital defects, increased intracranial pressure, or idiopathic. Symptoms include clear/watery nasal discharge, salty/metallic taste in mouth and headache. It is a rare but serious condition that can lead to meningitis, brain herniation, or intracranial hypotension.

**Case:** A 32-year-old female presented with anosmia and a persistent clear nasal discharge for three months. She reported a history of nasal trauma due to a fall three months prior. She denied any recent head injuries, fever, or pain. The patient was administered a head CT, which revealed no evidence of any abnormality. Neurological examination was normal. A lumbar puncture was performed, and the CSF was clear with a WBC count of 4 and a glucose level of 72 mg/dL. The patient was referred to a neurosurgeon for further evaluation.

**Conclusion:** CSF rhinorrhea is a rare but serious condition that requires prompt diagnosis and management to prevent complications such as meningitis, brain herniation, or intracranial hypotension. Further evaluation and management by a neurosurgeon is recommended.
#22. Diabetes and Claudication: Reduced Pain Perception; Worse Walking Impairment and Quality of Life
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Mentor: Pooneh Bagher
Program: General Surgery
Type: Original Research

Background: The effects of diabetes in patients with peripheral artery disease (PAD) who present with claudication is poorly defined. We hypothesized that diabetic patients with diabetes would display worse characteristics including angiographic disease distribution, physiology of oxygen delivery, walking ability, at home physical activity (HPA), and quality of life (QoL) than patients without diabetes.

Methods: We recruited claudicating PAD patients and compared diabetics (N=15, HbA1c>6.5%) to non-diabetics (N=61). We reviewed baseline Ankle Brachial Indices (ABI), CT angiography (CTA), 6 minutes walking distance (6MWD), treadmill initial (ICD) and maximal (MCD) claudication walking distance with concurrent calf muscle oxygenation (STO2) measurements with near infrared spectroscopy, QoL questionnaires and HPA measured using pedometers.

Results: The diabetic group had higher BMI (31.1±6.8 vs26.4±4.4, p<0.01), and hyperlipidemia (93% vs72%, p<0.01). There were no differences in ABI, CTA, MCD and parameters of (STO2). Diabetic patients had longer initial claudication distances (ICD) (208.2±133.7 meters vs124.0±94.5, p<0.02) and shorter pain recovery times (RT) (287.4±234.8 seconds vs133.9±126, p<0.005). Diabetics had shorter 6MWD (252.3±62.3 meters vs 298.4±60.2, p<0.02), 50% (p<0.005) lower HPA, and worse measures of social functioning, emotional well-being, energy, and fatigue.

Conclusion: Diabetic PAD patients had unexpected longer ICDs, and shorter RTs suggesting significant alterations in the pain perception and pain pathways of the leg. They also had decreased performance on HPA and 6MWD with worse QoL measures suggesting that diabetes predisposes to worse walking outcomes and QoL in PAD. Identification and aggressive management of PAD should be given priority in diabetics as presenting symptoms may be milder despite worse outcomes and QoL.

#23. Length and Proximal Extent of Occlusion Dictates Severity of Disease in a Mini-Swine Model of Peripheral Artery Disease
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Mentor: Mark Carlson
Program: General Surgery
Type: Original Research

Background: There is ongoing need for large animal models of peripheral artery disease (PAD) mimicking human disease. We present mild, moderate and severe phenotypes of PAD in an Ossabaw swine model.

Methods: After 8 weeks of a western diet, we induced right hindlimb ischemia induction(T0) with open ligation and resection of Right Superficial Femoral Artery for mild (N=4), endovascular coil occlusion of Right External Iliac Artery, Right Superficial Femoral Artery for moderate(N=9) and coil occlusion of Right External Iliac Artery, Right Superficial Femoral Artery, and right internal iliac artery for severe(N=4). At 4 weeks (T4) and 8 (T8), all swine underwent angiography and bilateral gastrocnemius biopsy. All swine underwent bilateral ankle brachial indices (ABI), and calf muscle tissue oximetry (STO2) measurements at T0, T4, and T8, and weekly measurement of their treadmill walking distance.

Results: At T4 and T8, there was worsening of Right ABI, Right calf STO2, and treadmill...