UAB MEDICINE

March 2021 Education Newsletter

Glomerular Disease

with a Focus on Nephrotic Syndrome

Tim's Take Home Pearls:

***Glomerular disease is characterized by abnormal filtration of the blood, leading to loss of protein & blood cells; it should be considered whenever you encounter proteinuria or hematuria without another explanation.**
***Glomerular disease is often categorized into nephritic & nephrotic syndrome, though the entities often overlap.**
***Manifestation of nephrotic syndrome includes proteinuria, edema, hypercoagulability, and hyperlipidemia.**
***In very general terms, primary nephrotic syndromes are treated with immune suppression, while secondary disease is treated by addressing the primary etiology.**

General Characteristics of Glomerular Diseases:

- Glomerular anatomy: *see figure A and B on page 2*, but glomeruli are bundles of capillaries (fed by the *afferent* arterial and drained by the *efferent* arterial) which are surrounded by the urinary space and Bowman's capsule. The glomerular basement membrane, along with epithelial cells called podocytes, separates the "blood space" from the urinary space. Finally, mesangial cells form the support structure for the glomerulus. It's important to note these different cells types as all glomerular disease results from damage to one (or more) of these cells.
- Glomerular disease can be primary (intrinsic renal pathology) or secondary (to systemic disease).
- The most common distinction within glomerular diseases is made between *nephritic* syndrome and *nephrotic* syndrome, though many conditions have features of both patterns, and some may progress from one pattern to another.
- Glomerular disorders are, in general, characterized by impairment of filtration of the blood; this results in excretion of large substances such as plasma proteins and blood cells (which are *usually* kept on the *blood* side, and not spilled into the *urine* side).

Nephrotic Syndrome:

- Nephrotic syndrome is usually caused by injury exclusively to the podocytes or the GBM.
- It is characterized by
    - Significant proteinuria: this is due to the aforementioned abnormal filtration of serum proteins; leading to protein loss *from* the blood *into* the urine
    - Hypoalbuminemia: again, albumin, like other proteins, is being inappropriately filtered into the urine
    - Edema: as protein is lost into the urine, there is loss of the serum oncotic gradient, resulting in tissue edema
    - Hyperlipidemia and lipiduria/fatty casts in urine: the low oncotic pressure that results from the protein loss into the urine directly stimulates lipoprotein production by hepatocytes
    - Hypercoagulability: this is not well understood by is likely due to loss of anticoagulant proteins (such as antithrombin, plasminogen, and Protein C and S) into the urine
    - Increased risk of infection: immunoglobulins, which are proteins, are being lost into the urine (see a recurring theme here?)

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Most Common Causes of Nephrotic Syndrome:

Condition	Clinical Associations	Diagnosis	Treatment
FSGS	*Most common cause in African Americans. *Can be associated with morbid obesity and HIV	Biopsy	Steroids
Membranous glomerulopathy	*Most common cause in white patients *Usually idiopathic, most common secondary causes are hepatitis B and C, malaria, syphilis, SLE, NSAIDS, and malignancy	Biopsy	*Disease frequently remits on its own; if not, steroids. *Treat concurrent infections.
Minimal change disease	*Most common cause of primary nephrotic syndrome in children *Accounts for ~10% of nephrotic syndrome in adults	Biopsy	Steroids
Diabetic nephropathy	*Most common secondary cause and most common cause overall in adults.	Clinical Diagnosis	*Reduce A1C *ACE or ARB for albuminuria

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