OEDEMA IN CHILDREN **ASSESSMENT AND INVESTIGATIONS**

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DEFINITION.

- Oedema is a clinical condition characterized by an increase in interstitial fluid volume and tissue swelling that can be either localized or generalized.

- Severe generalized edema is known as anasarca.

- More localized interstitial fluid collections include ascites and pleural effusions.

MECHANISMS OF OEDEMA IN CHILDREN

- Increased hydrostatic pressure due to sodium and water retention. (CHF, AGN, RF)
- Increased Capillary hydrostatic pressure from Obstruction.(Venous obstruction, Liver Cirrhosis)

- Decreased Capillary Oncotic pressure following Hypo albuminemia (SAM, Protein Loosing Enteropathy)
- Increased Capillary Permeability. (Nephrotic Syndrome, Angio-Oedema)

- Lymphatic Dysfunction/Obstruction (Primary Lymphoedema, Secondary Lymphoedema)
- Iatrogenic Fluid overload.

ASSESSMENT/EVALUATION

- The goals of the evaluation of a child with oedema include the following:

- Determine the underlying cause and character of the edema (localized or generalized), which will guide both evaluation and treatment.

- Identify those conditions that are potentially life-threatening, although most causes of edema are self-limiting disorders.

EVALUATION OF A CHILD WITH EDEMA BEGINS WITH A THOROUGH HISTORY.

- Edema location.- Generalized or localized.
- Establish time course e.g. age at onset and duration of symptoms.
- Associated complaints that suggest systemic disease or major organ dysfunction. (Breathlessness, Jaundice, Reduced urine output)
- Additional concurrent illnesses or signs. A streptococcal infection 1-3 weeks prior may point to poststreptococcal glomerulonephritis.

HISTORY:

- Past medical and family history of recurrent angioedema may suggest hereditary angioedema.
- Weight gain and tight-fitting clothes and shoes- onset of edema due to nephrosis.
- Do a 24 hour dietary recall- in the case of possible Edematous Severe Acute Malnutrition
- History of allergies and current medications. Allergies and adverse reaction to certain medications can present as angioedema in childhood.

ASSESSMENT:

- Measuring the child's growth parameters. (Anthropometry) and general physical exam.
- Fully evaluating the cardiovascular system, including vital signs to ascertain whether child is in heart failure or not. Do thorough systemic exam.
- Increased blood pressure (BP) levels may reflect hypervolemia resulting from acute kidney injury (AKI), chronic kidney disease (CKD) or glomerulonephritis.
- BP measurements are interpreted in relation to the patient's age, sex, and height percentile.

ASSESSMENT:

- Characterizing the edema as localized or generalized, and assessing the extent of edema- grade the edema etc.

- A child with diaphoresis, dyspnea on exertion, and/or a history of heart disease may have edema secondary to heart failure

- A child with a history of food allergies may present acutely with urticaria and angioedema after allergen exposure.

ASSESSMENT

- A history of jaundice, failure to thrive, steatorrhea, or abdominal pain should point the clinician toward a diagnosis of liver failure/disease or possibly a protein-losing enteropathy

- A child with progressive anasarca with a significant periorbital component, but minimal systemic complaints, may have nephrotic syndrome.

- Cola-colored urine with either generalized or facial edema strongly suggests acute glomerulonephritis. These patients also may have hypertension.

ASSESSMENT:

- Edema, anorexia, and growth impairment can be seen in a child with CKD.
- A newborn girl with edema of the hands and feet, webbed neck, nail dysplasia, high palate, and short fourth metacarpal may have Turner syndrome.
- New born baby with Hemorrhagic disease of newborn.

INVESTIGATIONS:

Initial Tests.

- A complete blood count (CBC)
- serum chemistry tests (serum creatinine, blood urea nitrogen [BUN] albumin, and liver function studies)
- urinalysis.
- CRP/ESR
- RDT/ BS for Malaria Parasites
- Underlying Chronic disease e.g. SCA, HIV, CHD/RHD,ALL etc.

INVESTIGATIONS

- **Subsequent testing** — based on results of the initial evaluation.
- **Kidney disease**
- Suspected glomerulonephritis – Complement testing and serologic testing may identify the specific renal disease.

- Complement testing can classify glomerulonephritis as either hypocomplementemic or normocomplementemic.

- Serologic testing e.g., antistreptococcal antibodies (poststreptococcal glomerulonephritis), antinuclear antibodies (ANA), anti-double-stranded DNA antibodies (lupus nephritis).
- A renal biopsy - suspected glomerulonephritis in patients with significant renal dysfunction, normocomplementemia, heavy proteinuria without an underlying diagnosis.

INVESTIGATIONS:

- Viral infection – Serologic screening for markers of occult viral infection that affects the kidneys e.g. Hepatitis B, Hepatitis C and HIV.

- **Imaging is of the kidney**.
- kidney ultrasonography to determine the presence of one or two kidneys, assess kidney size, and detect cystic kidney disease and hydronephrosis.
- An edematous newborn male with a poor urinary stream ultrasound with bilateral hydronephrosis on U/S with or without a thickened bladder wall are consistent with obstructive uropathy from posterior urethral valves (PUV).
- A teenager with renal failure in whom an ultrasound may demonstrate small shrunken kidneys. This may have resulted from congenital kidney hypoplasia or scarring from reflux nephropathy.

CONDITIONS AND THEIR SPECIFIC INVESTIGATIONS:

- **Chronic liver disease or protein-losing enteropathy** – suspected in a child with hypoalbuminemia, but no proteinuria.
- LFT's including total serum protein levels, PT (Raised)
- stool level of alpha-1 antitrypsin is the **best screening** test for protein-losing enteropathy.

- **•Heart failure** – Chest radiography, electrocardiogram, echocardiography, and laboratory tests e.g. brain natriuretic peptide [BNP] help confirm the diagnosis, ascertain severity of heart failure, and determine the underlying cause.

CONDITIONS AND THEIR SPECIFIC INVESTIGATIONS:

- **Venous thrombosis** – localized swelling with associated discoloration of the extremity of affected area confirm diagnosis duplex ultrasonography.

- ●**Hemolytic disease of the newborn** – Severe hemolysis in a newborn can result in a hydropic infant with generalized oedema because of ABO blood type incompatibility/Rh disease.

- ●**Angioedema** – With suspected angioedema, plasma levels of the complement components, C1q, C4, C2, and C1 inhibitor may help diagnose inherited or acquired C1 inhibitor deficiency. With the inherited forms, C4 and C2 levels are chronically low in the majority of patients.

QUESTIONS??

Mwanyala Naabi/ Thank you very much .