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PRACTICAL APPROACH TO ELECTROLYTE DISTURBANCES

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Abstract: With the advent of emergency and critical care units, electrolyte disturbances are being recognized in every hospital more often than before. They are commonly associated with critical illness of any etiology. Amongst the sodium and potassium disturbances, hyponatremia is commonly encountered among the hospitalized children, next common being hypokalemia and hyperkalemia. Common manifestations of hypoaquadernatremia are convulsions and irritability secondary to osmolar disturbances. Potassium being the electrolyte responsible for biological electricity, disturbances in this cation results in cardiac arrhythmia and weakness. Knowledge on electrolyte disturbances is mandatory for any pediatrician managing hospitalized children.

Keywords: Electrolyte disturbances, Hyponatremia, Hypernatremia, Hypokalemia, Hyperkalemia, Children

Points to Remember

- It is mandatory to check serum electrolytes in hospitalized children, particularly those on intravenous fluid therapy.
- Hospital acquired hyponatremia is being increasingly reported and hypotonic intravenous fluid is to be avoided in maintenance therapy.
- Though concept on hypernatremia management appears complex, management guidelines for hypernatremia are simple by using half normal saline at 1.25-1.5 times maintenance, with frequent monitoring of serum sodium level.
- Potassium as a drug has to be handled with caution and practised as per the guidelines and by experienced medical or paramedical personnel.
- Hyperkalemia is a medical emergency and should be managed stepwise, simultaneously evaluating for the underlying cause.
- Every pediatric practitioner managing hospitalised children should update their knowledge on fluid electrolyte therapy, because IV fluid is the commonest drug used in hospital.

Acknowledgment

Dr. Niranjan Vijayakumar for drawing the figure.4.

References


METABOLIC ACIDOSIS IN PICU

*Indira Jayakumar

Abstract: Disorders of acid–base equilibrium are common in critically ill and injured patients. The presence of these disorders often signals severe underlying pathophysiology and particularly metabolic acidosis, is a significant marker of adverse outcome. Metabolic acidosis is a clinical disturbance characterized by an increase in plasma acidity. Accumulating evidence suggests that a significant proportion of these disturbances in pediatric intensive care unit (PICU) patients can result from therapy too. So, it is essential that clinicians understand why they occur and how to avoid them.

Keywords: Acid base disorder, Metabolic acidosis, Anion gap, Delta gap.

Points to Remember

• pH derangement is a canary (heralds trouble). Be aggressive in ascertaining cause of acidosis and treating it rather than administering bicarbonate to artificially correct pH.

• Check the anion gap (correct for albumin) even if there is no apparent acid-base disturbance.

• Check for delta gap for concealed acidosis or alkalosis. Both wide anion and normal anion gap acidosis can coexist.

• Avoid large quantities of saline (use balanced solutions containing low chloride) to prevent hyperchloremic acidosis.

References


RESPIRATORY FAILURE - RECOGNITION AND INITIAL MANAGEMENT

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Abstract: Respiratory disorders in children can present as emergencies. Early recognition and prompt management are required as they have a potential to deteriorate to cardiac arrest. The causes can be related to airway, lung parenchyma or neurological problems. A systematic clinical approach based on Pediatric Advanced Life Support (PALS) helps to categorize the severity as well as the type of problem. This approach helps to initiate the immediate measures and escalate the treatment if required. This article outlines the pathophysiology, categorization and initial management of respiratory failure in children.

Keywords: Respiratory failure, Respiratory distress, PALS, Initial management, Ventilation.

Points To Remember

- Children with respiratory problems may present with respiratory distress or respiratory failure
- In early stages, the child may attempt to increase oxygenation and ventilation by increasing the respiratory rate, heart rate and work of breathing and when these fail, may show features of respiratory failure
- Children with neurological problems may directly present as respiratory failure without taking ‘respiratory distress’ route
- A systematic PALS-based approach helps in categorizing the severity as well as the type of respiratory distress/failure and guide in initial stabilization measures
- When improvement is not seen with initial measures or the child has respiratory failure on presentation itself, non-invasive ventilation with CPAP or invasive ventilation has to be carried out.

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ACUTE RESPIRATORY DISTRESS SYNDROME

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Abstract: The acute respiratory distress syndrome (ARDS) is an important cause of acute respiratory failure which is often associated with multiple organ failure. Disruption of the alveolar capillary membrane by direct or indirect injury with increased permeability, followed by accumulation of inflammatory cells, dysregulated inflammation and uncontrolled activation of coagulation pathway are the central pathophysiological events of ARDS. Overall therapeutic approach is on lung protective ventilation with low tidal volume with the use of optimal PEEP, prevention of secondary complications such as ventilator induced lung injury (VILI) and nosocomial infections. New insights into the pathophysiology offer new therapeutic options. New therapeutic modalities refer to corticosteroid, surfactant and inhaled nitrous oxide (NO). High frequency oscillatory ventilation (HFOV), prone ventilation and airway pressure release ventilation (APRV) are used as rescue measures.

Keywords: Acute respiratory distress syndrome, Lung protective ventilation, High frequency oscillatory ventilation, Inhaled nitric oxide, Surfactant.

Points to Remember

- Incidence of pediatric ARDS varies from 8.5 to 27 per 1000 pediatric intensive care unit admissions.
- Can be due to varied causes leading to lung injury either directly or indirectly.
- Low tidal volume with optimal PEEP strategy is employed for managing ARDS.
- High frequency oscillatory ventilation (HFOV) is used as rescue therapy with inhaled nitric oxide and ECMO.
- Fluid management, glycemic control, analgesia, management of anemia are equally important.

References


WEANING FROM VENTILATOR

**Shanthi S**

**Abstract:** Mechanical ventilation in critically ill children, though life saving, may result in a number of complications especially if the duration is prolonged. Hence every child should be weaned off the ventilator at the earliest opportunity. However a premature attempt at weaning can also increase the morbidity and mortality. Traditionally patients were weaned slowly with gradual reduction of ventilatory support. A lot of research has been carried out on this issue of weaning in adults and children. Many studies recommend a daily spontaneous breathing trial to assess for the readiness to extubate. This article will focus on the various weaning methods in children and the common causes of weaning failure.

**Keywords:** Weaning from ventilator, Children, Spontaneous breathing trial, Readiness to extubate.

**Points to Remember**

- The most important criterion for weaning is that the underlying disease process which necessitated MV should have improved.
- Once-a-day SBTs are found to reduce the duration of ventilation.
- Intermittent mandatory ventilation is not recommended for weaning.
- T-piece and pressure support are found to be effective in weaning.
- Upper airway obstruction is the most common cause of extubation failure in children.
- NIV may become the weaning method of choice in future.

**References**


MYOCARDITIS – STRATEGIES TO IMPROVE SURVIVAL

*Meera Ramakrishnan

Abstract: The spectrum of presentation of pediatric myocarditis ranges from minor flu-like illness with chest pain to acute cardiogenic shock in a previously healthy child. The management of patients with myocarditis depends on the severity of illness. For patients with milder symptoms who can fall into the category of sub-acute heart failure, the mainstay of therapy is still supportive management with oral anti-failure medications such as angiotensin-converting enzyme inhibitors, beta-blockers and diuretics. In fulminant myocarditis, despite the severe symptoms, chances of spontaneous recovery are very high. This makes aggressive supportive care, including mechanical circulatory support, very rewarding. The role of immunosuppressive/immunomodulation therapy with intravenous gamma-globulin, continues to be controversial. In patients with severe heart failure unresponsive to conservative management with mechanical ventilation, inotropes and rhythm control, extracorporeal support is being used in various parts of the world as treatment prior to spontaneous recovery or as bridge to heart transplantation.

Keywords: Myocarditis, Extracorporeal support, Angiotensin-converting enzyme inhibitors (ACE inhibitors), Mechanical ventilation, Heart failure.

Points to Remember

- Fulminant myocarditis has very high mortality.
- Aggressive management has upto 80% chances of survival.
- Inotropes to be used only initially to improve the cardiac output.
- Prolonged β receptor stimulation increases cardiomyocyte apoptosis.
- Mechanical circulatory assistance is useful when the support needed is high.
- In the recovery phase of myocarditis β blockers, spironolactone and ACE inhibitors should be used.
- Use of immunomodulators are controversial.

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NOSOCOMIAL INFECTIONS

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Abstract: An infection acquired in hospital by a patient who was admitted for a reason unrelated to it, is known as nosocomial infection. It is an infection occurring in a patient admitted in a hospital or other health care facility in whom the infection was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge, as well as occupational infections among staff of the facility. It is one of the important causes of mortality and morbidity, increase in duration of stay and cost in the intensive care units. The most common ones are blood stream infections, pneumonia including ventilator-associated pneumonia, urinary tract infections, surgical site infection and gastroenteritis due to Clostridium difficile. The incidence of hospital acquired infections (HAI) can be reduced by following the guidelines for their prevention.

Keywords: Nosocomial infection, Hospital-acquired infection, Ventilator-associated pneumonia, Catheter-related blood stream infection.

Points to Remember

- The most common nosocomial infections are blood stream infections, pneumonia including VAP, urinary tract infections and surgical site infections.
- In VAP Gram negative organisms and Staph aureus are the main causative organisms.
- VAP is diagnosed based on clinical, radiological and lab findings.
- For prevention of VAP the main strategies are hand hygiene, prevention of aspiration of secretions, prevention of colonization of aerodigestive tract and prevention of use of contaminated equipments.
- Prevention of catheter related blood stream infections involves aseptic insertion, proper catheter safe dressing and periodic education of health care personnel in handling catheters.

References


**SNAKEBITE ENVENOMATION IN CHILDREN: CRITICAL CARE ISSUES**

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Abstract: The highest burden of snake envenomation existed in South Asia, Southeast Asia and Sub-Saharan Africa where >100,000 instances of envenoming occur annually. Among the Southeast Asian countries, India has emerged as the country with the highest mortality with snake envenomation. Snake venom is the most complex of all natural venom and poisons of which, 90% are pharmacologically active peptides and proteins. The composition of the venom is species-specific, i.e., neurotoxins predominate in the venom of elapids, while cytotoxic and anticoagulant D procoagulant substances are most often found in the venom of vipers and colubrids. The amount of venom injected is not related to the size of the snake or the fangs, or the number of strikes.

Neurotoxic features vary from early morning neuroparalytic syndrome to locked-in syndrome in snake bite. Physicians should recognize the locked-in syndrome (LIS) to prevent the dangerous error of diagnosing brain death. The most common coagulopathy associated with snake envenoming is a procoagulant or consumption coagulopathy. Renal involvement following snake bite envenomation is seen predominantly with the bite of the vipers. Compartment syndrome is rare in children and usually affects upper limb. Aims of first aid treatment include (i) attempt to retard systemic absorption of venom (ii) preserve life and prevent complications (iii) arrange the transport of the patient to a place where he or she can receive medical care and (iv) to do NO HARM. Twenty-minute whole blood clotting time (20WBCT) is a very useful and informative bedside standard test in the management of snake envenomation. Antivenom treatment should be given as soon as it is indicated.

Keywords: Snake bite, Children, Locked-in syndrome, Snakebite induced coagulopathy, Anti-snake venom.

Points to Remember

- Among the Southeast Asian countries, India has the highest mortality due to snake envenomation and approximately 70% of snake bites are ‘dry’ bites and do not result in envenomation.
- Clinically relevant components of the snake venom have cytotoxic, hypotensive, neurotoxic, or anticoagulant effects.
- The amount of venom injected is not related to the size of the snake or the fangs, or the number of strikes.
- Physicians should be aware and recognize the ‘locked-in’ syndrome, so as to prevent the dangerous error of diagnosing brain-death.
- A significant difference between VICC and DIC is that, in VICC, there is no obvious fibrin deposition, microvascular thrombotic obstruction, and resultant end-organ damage or organ failure.
- It is important to avoid giving therapies that may exacerbate the coagulopathic process like heparin, warfarin, FFP and cryoprecipitate.
- Thrombotic microangiopathy associated with snake envenoming can be resolved with supportive care, and in many cases it is not recognized as such.
- The priorities for treatment of people bitten by snakes are transport to medical care as quickly as possible irrespective of nature of bite and symptoms.
- Unless a bite by a neurotoxic elapid can be excluded, the bitten limb should be bandaged and immobilized with a splint (pressure immobilization) or a pressure pad.
- 20-minute whole blood clotting test (20WBCT) is very useful and informative bedside standard test for coagulopathy in the management of snake envenomation.
• Antivenom treatment should be given as soon as it is indicated and should be administered over one hour at constant rate with hemodynamic monitoring.

• Antivenom is relatively costly and often in limited supply, it should not be used indiscriminately.

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DERMATOLOGICAL EMERGENCIES IN CHILDREN

*Anjul Dayal

Abstract: Emergencies in dermatology are well recognized and are associated with significant morbidity and mortality. Early recognition of these conditions with institution of prompt medical care can help in reducing the associated morbidity and mortality. This article reviews relevant dermatologic emergencies with emphasis on current trends in management.

Keywords: Stevens-Johnson syndrome, Pemphigus, Staphylococcal scalded skin syndrome, Toxic epidermal necrolysis.

Points to Remember

• In dermatological emergencies, there are very few diagnostic laboratory tests.
• Diagnosis, treatment, and management are based heavily on clinical assessment and clinical judgment.
• A case-based approach will decrease the morbidity and mortality in children.
• Most often these emergencies require a multi-disciplinary approach.
• As the child may very rapidly deteriorate, it is essential that a child with severe skin problem should be treated at pediatric tertiary care facility.

References


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GENERAL ARTICLES

APPROACH TO CHILD WITH DISORDER OF SEXUAL DIFFERENTIATION

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Abstract: Children with disorder of sexual differentiation (DSD) are a special group requiring assistance in planning and executing their treatment by a multidisciplinary team which includes the pediatrician, endocrinologist, pediatric surgeon, urologist, psychologist and social worker. A thorough knowledge of the pathophysiology of sex steroid metabolism, gonadal development and various factors including genetic conditions that predispose to the aberration in development of gonads might be useful in management of these children. This article presents discussion of the above facts with appropriate review of literature.

Keywords: Disorder of sexual differentiation, Child, Approach.

Points to Remember

- A child with genital ambiguity is an enormous stress to the family. Parents should be counseled to accept that it is not a matter of shame and these children can lead a functional and meaningful life in the society.

- The principal emphasis should be on avoiding gender dissatisfaction and gender dysphoria in adolescence as far as possible.

- A proper evaluation to arrive at the etiological diagnosis can help in deciding the appropriate sex to be assigned.

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PREBIOTICS AND PROBIOTICS IN CHILDREN

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Abstract: Pre and probiotics help by altering the microflora of the host. Probiotics are foods or live organisms mostly bacteria or yeast contributing to healthy microbial flora suppressing harmful microbes. They play a main role in prevention and management of gastroenteritis, especially antibiotic associated diarrhea. Other less common indications are inflammatory bowel disease, necrotizing enterocolitis, constipation, etc. Few more indications for preventive therapy in pediatrics are being explored.

Keywords: Probiotics, Prebiotics, Gastroenteritis, Children.

Points to Remember

- Pre and probiotics have the potential to alter the microflora of host leading to a healthy microbial environment and suppression of harmful microbes.
- Using probiotics with antibiotics could significantly reduce antibiotic associated diarrhea.

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MANAGEMENT OF ULCERATED INFANTILE HEMANGIOMAS

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*** Devaraj Kumar Dinesh

Abstract: During the past several years, there have been new advancements in the management of infantile hemangiomas (IHs). In many patients, no treatment is ever necessary, because IHs are well known for their natural history of spontaneous involution. However, a significant minority of hemangiomas do require treatment. Moreover, they are very heterogeneous, making the decision of when, how and why to intervene quite variable. The least common but the most important rationale for intervention is the presence of a life- or function-threatening complication, where prompt therapeutic intervention is a necessity. A much more common scenario is ulceration, where appropriate management is needed to expedite healing and control pain. Increasingly, the life-altering aspects of hemangioma are being recognized as a rationale for treatment because permanent scarring and disfigurement can result even if involution is complete. Treatments for IHs currently include topical, intralesional, and systemic therapies. Laser and surgical modalities are also used depending on the clinical scenario. In the absence of rigorous evidence-based studies, clinicians must carefully weigh the risks and benefits of medical or surgical treatments versus observation alone.

Key words: Hemangioma, Infantile, Ulcerating, Management.

Points to Remember

• A minority of infantile hemangiomas do require treatment.
• Making the decision of when, how, and why to intervene is quite variable.
• The most important rationale for intervention is the presence of a life- or function-threatening complication, where prompt therapeutic intervention is a necessity.
• A common scenario is ulceration, where appropriate management is needed to expedite healing and control pain.
• Treatments for IHs currently include topical, intralesional, and systemic therapies. Laser and surgical modalities are also used depending on the clinical scenario.
• In the absence of robust evidence-based studies, clinicians must carefully weigh the risks and benefits of medical or surgical treatments versus observation alone.

References


MANAGEMENT OF VASCULAR ANOMALIES

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Abstract: The term hemangioma as referred to most commonly in the past for all types of vascular lesions, has been redefined. In this era a lot of research and understanding of these lesions has provided the latest terminology for vascular lesions as vascular anomalies which could be either hemangiomas (vascular tumors) or vascular malformations. This review article aims at an in-depth discussion of all the modalities of management of the vascular lesions excluding the lymphatic malformations and provide a ready reference to the practicing pediatrician and surgeon who encounter these conditions on a regular basis.

Keywords: Vascular anomaly, Hemangioma, Vascular malformation, Management.

Points to Remember

- Vascular anomalies require multidisciplinary treatment.
- Treatment modalities include medical, surgical, LASER, sclerotherapy and embolisation.
- Management outcome depends on the correct selection of treatment modality.

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CASE REPORT

EOSINOPHILIC CHOLANGIOPATHY IN A VERY YOUNG CHILD – A RARE CASE OF RECURRENT ABDOMINAL PAIN

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Abstract: Recurrent abdominal pain is a common problem in pediatric gastroenterology practice. Rarely, eosinophilic involvement of the hepatobiliary system can present as recurrent abdominal pain. Peripheral blood eosinophilia and eosinophilic infiltration of the tissues such as gastrointestinal tract and hepatobiliary system may be seen in association with a number of conditions, but may occasionally occur in isolation. We report a rare case of eosinophilic cholangiopathy presenting as recurrent abdominal pain. The child had peripheral eosinophilia, distal common bile duct narrowing and tissue eosinophilia. She was managed surgically along with oral steroids.

Keywords: Eosinophilic cholangiopathy, Benign biliary stricture, Children, Recurrent abdominal pain.

References


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STAPHYLOCOCCAL OSTEOMYELITIS WITH DEEP VEIN THROMBOSIS

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Abstract: Acute osteomyelitis is a severe form of staphylococcal infection. Deep vein thrombosis (DVT) with septic pulmonary embolism (PE) has been described as a rare association with disseminated staphylococcal disease (DSD) especially when associated with osteomyelitis. The authors describe a 7 year old child affected with acute osteomyelitis with DVT. All cases of acute osteomyelitis/DSD warrant a high index of suspicion for DVT as there can be a clinical overlap and if not recognized early can adversely affect the outcome.

Key words: Osteomyelitis, Deep vein thrombosis

References


