Debate on Use of Colloids in Burn Fluid Resuscitation: A Renewed Interest

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Burns is one of the major injuries which is more prevalent in low and middle-income countries (LMIC). Thermal injuries are reported more frequently. Most of these injuries occur at home and all age groups are affected. This results in significant morbidity as well as mortality. Flame burns are associated with high fatality in comparison with scald, electrical, radiation and chemical burns. High growth rate, overcrowded houses, physical infrastructure, lack of implementation of local laws, illiteracy and awareness are some of the factors responsible for such injuries. In addition, presence of dedicated facilities for patients with burns injuries and availability of medical, nursing and allied health professionals to deal with such injuries are also not available in majority of the LMIC.[1]

Skin provides a barrier to the deeper body structures as well as perform number of useful functions in addition to maintaining body physiology. When this protective layer is affected by burns injury, be it a flame burn or scald, fluid loss occurs. After thermal injury variable degrees of skin and deeper tissues are burnt. Different classifications of extent of burns injuries are proposed to help clinicians in assessing the percentage of burns, it's effect on the body physiology as well as guide treatment plan.

Pathologically, burns injuries are divide into three zones. The outermost zone is called the zone of hyperemia. Unique pathophysiological changes following the injury. A significant shift in fluid dynamics occurs as a result of capillary leak syndrome especially in this area due to vasodilation. It results from the production of chemical mediators due to the inflammation. In addition, a hypermetabolic state is ensued. The massive loss of fluid can lead to hypovolemia and tissue hypoperfusion. This may lead to multi-organ dysfunction.[2]

The initial challenges in the management of the thermal burns is the maintenance of hemodynamic stability by maintaining homeostasis in addition to other specific measures like burns wound care, pain management and supportive care in initial couple of days. Burns fluid management is a controversial subject. Traditionally, crystalloids infusion is preferred over any other fluids in the initial period after burns injury. There are several formulas reported in literature based upon percentage of burnt area, weight (age based), and surface area of the body. Parkland formula is more frequently used all over the world. The infusion time and aliquots are also not agreed upon. The Parkland formula is more of a generalization. The individual requirements of the patients and presence of comorbid are also not taken into the considerations. However, each patients is unique and the treatment has to be tailored accordingly. The total amount of formula based fluid is a large volume that may lead to the number of consequences like pulmonary edema and electrolyte imbalance, to mention a few.[3]

The role of colloids solutions during the resuscitation of burns patient has been discussed in the past and was considered unsafe. However, a renewed interest has been shown in its use in selective situations and at particular point in time, during resuscitation. Colloid solutions may be useful by exerting oncotic pressure within the circulatory system thus reducing loss of fluid into the interstitium. Fluid creep results when during burns resuscitation more crystalloids are infused then required. This is frequently reported and may result in edema all over the body and compartment syndrome. Albumin is one of the colloids that is used for birns resuscitation. Its use is recommended into the later phase of the resuscitation when capillary leakage is reduced as a natural healing process that may take 12 to 24-hours.[4]

In a study by Comish et al, an adjustment has been made in their burns fluid resuscitation protocol that was based upon crystalloids. The attending physician

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at his discretion was allowed to use colloid as a rescue fluid. For this 25% albumin was used in those patients who failed to respond to traditional resuscitation. Its use decreased the volume of the fluid required per % of total body surface area burns. It also improved organ perfusion as noted by increased amount of urine produced by the kidneys. They recommended considering use of colloid as a fluid when required in a particular scenario.[5]

In medical sciences new evidence is continuously produced. The new information may reveal new knowledge or may improve current understanding. At times entirely new phenomenon emerges. Thus it is a continuous process where old approaches are challenged or revised and new protocols are recommended. This is akin to the progress and outright rejection must be avoided. The new findings related to old hypothesis once rejected, may be re visited again. An appropriately designed research protocol at multiple sites may produce more data that can improve our understanding of burns fluid resuscitation.

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