ORIGINAL ARTICLE

Fluid Resuscitation in Major Burns Our Experience at Burn Care Center PIMS Islamabad

INTRODUCTION A major goal of the initial management of burn injuries is to replace extra cellular fluid loss proportional to percent total body surface area (% TBSA) and to maintain tissue perfusion. Early aggressive treatment of burn shock has been the mainstay of burns resuscitation but recently there have been growing concerns that burn injured patients are being over fluid-resuscitated with excessive quantities of crystalloid in first 24 hours after burns. [1-4].

The term used for excessive fluid resuscitation is "fluid creap" [2] Excessive fluid resuscitation increases the chances extremity compartment syndrome abdominal compartment syndrome and acute respiratory distress syndrome (ARDS) [5-8].

In large burns intravenous fluid therapy in the basic protocol this avoid life threatening hypovolaemic shock and for this a number of resuscitation formulae are advocated [9].

The most commonly practiced formula is Parkland formula, developed by Baxter and Shires in 1968 which calculate total fluid requirements (ringer's lactate) in the first 24 hours has from injury as 4ml/kg/% TBSA [10,11].

The sodium load delivered with Parkland form is 0.6 mm /kg/ % TBSA during first 24 hours.
More recently fluid resuscitation in excess of Parkland formula has been observed [12-16].
This trend raises concerns as to the adequacy of the formula and complications associated with over-resuscitation which can limit perfusion to potentially recoverable burns and body organs not directly injured.

Keywords: *Fluid resuscitation major burns fluid creep.*

MATERIAL & METHOD

The study was conducted at Burn Care Center Pakistan Institute of Medical Sciences Islamabad, a tertiary referral center for burns, serving a large catchment area of northern part of the country.

Inclusion criteria were admission to burn ICU with acute burns injuries more than 20 % TBSA presented within 04 hours of injury during the study period, January 1, 2011 to December 31, 2011. The results were compared with similar injured patients treated at this center in the previous year from the record. For those patient where fluid records for 1st 48 hours were incomplete excluded from the study. Patients with HV Electrical injuries chemical burns and radiation burns were also not included.

Tariq Iqbal
Associate Professor & Head, Burns Care Centre, Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan.
Zahid Ali
Registrar, Burns Care Centre, Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan.
CORRESPONDENCE: Burns Care Centre, Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan.
Ph: +923005555068, +92519107512
E-mail: iqbalpims@yahoo.com , driqbal65@gmail.com

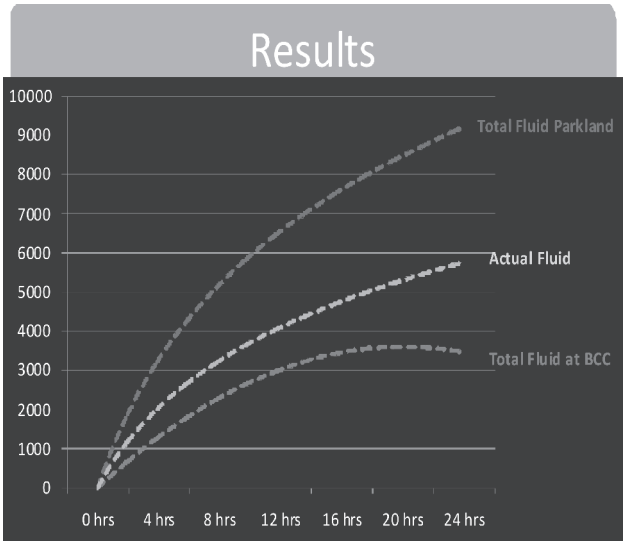
RESULTS

A total of 23 patients were studied with a mean age of 31 ± 18 years and average of 36 ± 12 % TBSA burn. Fluid resuscitation was started by calculating fluids as 2ml/kg/%TBSA of crystalloids (Ringer's Lactate) fluid for 1st 24 hours, half the volume administered in 1st 8 hours and half in next 16 hours. Colloids are also added in the 2nd phase of 16 hours. Volumes are adjusted according to urine output. In the 2nd 24 hours 5 % D/W replaces the Ringer's Lactate.

There were less incidence of pneumonia, extremity and abdominal compartment syndrome ARDS, renal systemic failure, sepsis and death (table – 1)

Clinical Outcome

Outcome	BCC Formula	Parkland Formula
Pneumonia	01	07
Compartment	Nil	03
Syndrome Extremity		
Compartment	01	04
Syndrome Abdominal		
ARDS	04	06
Sepsis	03	06
Renal Failure	NIL	02
CVS Failure	NIL	02
Deaths	Nil	02
Hospital Stay less	21	06
than 03 weeks		
Hospital stay more	02	17
than 03 weeks		



DISCUSSION

Despite years of experience with burn shock resuscitation this survey supports that concept that many controversies persist in treating burn patients in the first 24 h after injury. Clearly, many variations exist in resuscitation practices around the world. Such variation suggests that no particular formula or practice works better than another. Despite variations in practice, the Parkland formula which was created four decades ago persists as the favorite formula. In addition, lactated Ringer's solution, the fluid choice of the Parkland formula also dominates throughout the world. It is unclear whether the Parkland formula is favored because it is better or because it is the simplest and least expensive method of resuscitation. I suspect that simplicity has a great deal to do with its domination. Fortunately, most burn physicians do not rely solely on the formula but adjust the fluid based on the physiologic response of the patient.

It is also clear that colloids are starting to increase their presence in resuscitation practices. Twenty years ago we were taught that colloids were unnecessary and should never be used. Most surgeons now "cheat" by adding some form f colloids during the first 24 hours after injury. In my practice, I have been adding colloids earlier during resuscitation with what appears to be benefit to the patient. Many physicians are now starting resuscitation with either albumin or fresh frozen plasma. Slater's group has presented the use of a formula based on lactated Ringer's solution and fresh frozen plasma [11]. In China, the Third Military Medical University has a formula based on the use of a combination of crystalloid and colloid [15]. The Haifa formula is based on the use of plasma and crystalloid [16]; and finally, Demling has recommended the use of dextran and fresh frozen plasma [17]. After discussion at the 2006 State of the Science Meeting it has become apparent that the question of whether to use crystalloid or colloid during resuscitation has become a key question that needs to be answered [10].

The issue of "fluid creep" is on everyone's mind [1-4]. We do not want to over-resuscitate patients and suffer complications of ARDS and compartment syndromes.

There are many potential causes of "fluid creep". One major reason for over-resuscitation is simply not paying attention to detail. Many of the report on "fluid creep" suggest that urine output was above the target but the fluid rates were not decreased.

Regarding oral resuscitation in burns in the developed countries there really is little need for such a strategy since intravenous access is nearly automatic. In undeveloped countries there is clearly a need for such a strategy. Clearly, oral resuscitation protocols work well for cholera epidemics so they should help in at least medium sized burns [20,21]. Some form of oral resuscitation strategy would be great benefit during a disaster when intravenous resources become overwhelmed. Oral resuscitation should be explored in the future.

5. Conclusion

The large variance in formulas and fluid choices simply tell us that no protocol is perfect. The use of colloids is increasing so it is time to perform a prospective, randomized trial to determine whether there is a better way to treat burn shock. "Fluid creep" continues to plague resuscitation but the causes are not clear. Despite decades of using formulas we still have a long way to go to optimize burn shock resuscitation.

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