Nutrition in burned patient : د.احمد ميري

The hyper-metabolic state in a major burn lasts until the wound is closed .a burn of 40% TBSA causes a maximal metabolic effort equal to twice the basal energy expenditure .The hyper-metabolic state in a major burn is the same as that found in the stress response to trauma or sepsis ,but it is much stronger and longer than either .As in fluid resuscitation ,numerous formula abound for determining caloric and protein requirement in burn patients .similarly ,the response obtained by any given formula is more important than the composition or amount of the formula given .

Curreri formula : adult daily requirement as 25 calories /kg +40 calories per percent of burn .

Children :60 cal./kg +35 cal. Per percent of burn .

In normal diet calorie to nitrogen ratio of approximately 300 to 1 in burn patient (highly stressed) reserving higher nitrogen formulation and the ratio become 100-150:1 .

The average diet comprised of 25% to 40% fat ,essential free fatty acids must be supplied as well .Vitamins and mineral requirement are probably increased , vitamin C and A necessary co-factors for wound healing ,copper zinc and iron requirement ,have not been defined .

Significant systemic complications occur with a weight loss >10% of the ideal lean body weight .

Nutritional supplementation will be required in the majority of patients with burn>20% of TBSA

The gut of burn patient should be used for nutrition if it is available .Using naso-gastric enteral feeding ,if oral intake is limited ,starting 2-3 days post-burn and earlier if possible .

Total parentral nutrition is an option that must be used in some burned patients if entral feeding is difficult ,but it is clearly a second choice .Using central venous catheters and should be changed every 72 hrs There is little or no place for peripheral parentral nutrition .

Serum albumin has a long half-life and therefore insensitive to acute changes in nutritional status .The mainstay for our clinical monitoring is a weekly nitrogen balance study ,which is calculated in standard fashion from 24hr urine collection for urinary urea nitrogen .

Surgical treatment in burn :

Partial thickness burns should heal without surgical intervention ,but full thickness burns require surgical management .There are two alternative policies for deep burns. One can await spontaneous de-sloughing and apply split thickness skin graft 2t 3 weeks .This policy has the advantage that the early operation can be avoided ,but has the disadvantage of slow healing

and greater scarring that follows a granulating wound. Alternatively ,early surgical excision of the burn is carried out with application of skin graft .

There are two types of surgical excisions according to technique :

1.Tangential excision :using manual knives or dermatom to excise full thickness eschar until punctuate uniform brisk bleeding is seen .It is bloody procedures and adequate blood should be available .

2.Fascial excision :it is reserved for limited indications like very deep burn and elderly patients and has the advantage of an available bed for grafting is reliably provided and less blood loss if we use tournquit in extremities .

Following excision of burned tissue ,the raw area cover by split skin graft .this is harvested from a donar site on an unburned area of skin .

Donar sites children (buttoks) ,with extensive burns the thighs are the 1st choice and other sites on the limbs and trunk may be necessary in addition .The skin graft can be meshed to expand its area .

Surgical reconstruction of burn injury :

The major complication of burn injury is scarring .Hypertrophic or keloid scar can be limited by the application of pressure ,using pressure garment .Also topical silicone sheeting may be beneficial in limiting scar hypertrophy .Surgery is usually inappropriate .When burn scars cross surfaces near joint scar contractures may occur .Late surgical reconstruction may be needed to release these contractures. Broad contractures require release and insertion of skin graft ,such operations are particularly valuable in restoring the range of motion of a joint ,but often leave a less than pleasing aesthetic result .Where there is a localized linear contracture a better technique may be V-Y plasty and Z-plasty .In some circumstances contractures can be released and burn scar area reduced by means of tissue expansion technique .

Electrical burn :

The passage of electric current through the tissues causes heating that result in cellular damage. Heat produced is a function of resistance of tissue ,the duration of contact and the square of the current .Bone is a poor conductor of electrical current ,whereas blood vessels ,nerves and muscles are good conductors .Bone can therefore become very hot and cause secondary damage to tissues near to the bone .Low voltage (less than 1000 V) such as from a domestic supply causes significant contact wounds and may induce cardiac arrest ,but no deep tissue damage .High voltage burns (more than 1000 V) cause damage by two mechanisms ,flash and current transmission .The flash from an arc may cause a cutaneous burn and ingnite

clothing ,but not result in deep damage .High voltage current transmission will result in cutaneous entrance and exit wounds and deep damage (muscles ,……)

Hospital evaluation :

1-Adequete ventilation and maintenance of cardiac perfusion .

2-Estimation of the extent of associated surface burn .

3-The extremities are evaluated for neurovascular compromise (deep tissue injury and the relative absence of surface wound)often cause compartment syndrome and frank deep tissue necrosis that may need escharotomy or fasciatomy .

4-ECG ,continous monitoring if the current traversed the heart .

5-X-ray :especially of the cervical and lumbo-sacral spine and long bone .

6-Urine evaluation for the presence of hemochromogens ,in the presence of myoglobinurea ,it become essential to maintain a high urine volume to prevent pigment precipitation in tubules and subsequent renal failure ,it is essential that a dieresis of 100 cc urine per hour in adult and 1.5-2 ml/kg/hr in the child is maintained ,using mannitol (osmotic diereses)if necessary .

7-Prophlylactic antibiotic (high dose pencillin) in high voltage electrical injury .

8-Operative debridement (the surgeon must remain aware of the likehood of deep and progressive injury).So the patient may need multiple session of wound excision and not close the wound until be sure the wound clean and no underlying tissue necrosis .

Cold injury :the injury cause acute cellular damage with possibility of either partial thickness or full thickness burn .Severe cooling cause cellular disruption .Freezing injury seem to be less damaging to the connective tissue matrix than heat injury .Frost bite is due to prolonged exposure to cold and there is an element of ischaemic damage due to vasoconstriction .

Chemical injury :tissue damage depends on strength and quantity of the agent and the duration of the contact .Some agents penetrate deeply or may have specific toxic effect. Chemicals cause local coagulation of proteins and necrosis and some also have systemic effect (liver ,kidney).The harmful effect will continue until the chemical is diluted or neutralized .The most important initial treatment is diluted with running water .