



INSIGHTS OF AGNIDAGDA VRANA AND ITS MANAGEMENT WITH RESPECT TO BURNS

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INTRODUCTION

Burn injuries are an under-appreciated trauma that can affect anyone, anytime and anywhere.^[1] A burn is a wound in which there is coagulative necrosis of the tissue. Also defined as damage to the skin or deeper tissues caused by sun, hot liquids, fire, electricity, radiations or chemicals is a burn.^[2] Ayurveda which is an ancient science of treatment where the description of types, clinical features, treatments and complications of *Dagdha Vrana* having similarity to burn injury described in modern medicine. *Dagdha Vrana* (burn wound) which can be accidental or may be caused during para surgical procedures like *Agnikarma*. *Acharya Sushruta*, described *Dagdha Vrana* in the chapter '*Agnikarma Vidhi Adhyaya*' in *Sutrasthana*. In this *Adhyaya*, *Acharya* explains the clinical features, types and treatment protocol for individual type of burns.^[3]

ACCORDING TO SUSHRUTHA SAMITHA

Itharatha dagdha^[4]

इतरथा दग्धमिति प्रकारान्तरेण वैद्यादृते प्रमादाद्दग्धम् | Su Su 12/15 (डल्हण)

Itharatha dagda are the one which are caused other than *vaidya*

Types- *Sneha dagda*
Ruksha dagda

Sneha dagda

अग्निसन्तप्तो हि स्नेहः सूक्ष्मसिरानुसारित्वात्त्वगादीननुप्र-
विश्याशु दहति; तस्मात् स्नेहदग्धेऽधिका रुजो भवन्ति || (Su Su 12/5)

Ruksha Dagdha

Burns which are caused due to *रूक्ष द्रव्य* like *काष्ठ*,
पाषाण, *लोष्टा*

Involvement of *raktha* and *pitta* in *Agni dagdha vrana*^[5]

अग्निना कोपितं रक्तं भृशं जन्तोः प्रकुप्यति |

ततस्तेनैव वेगेन पित्तमस्याभ्युदीर्यते ||

तुल्यवीर्ये उभे ह्येते रसतो द्रव्यतस्तथा |

तेनास्य वेदनास्तीवाः प्रकृत्या च विदह्यते ||

स्फोटाः शीघ्रं प्रजायन्ते ज्वरस्तृष्णा च बाधते |

(Su Su 12/17-18)

TYPES OF AGNI DAGDHA VRANA^[6]

तत्र प्लुष्टं दुर्दग्धं सम्यग्दग्धमतिदग्धं चेति चतुर्विधमग्निद-
ग्धम् | (Su. Su. 12/16)

1. *Plusta dagda*
2. *Durdagda*
3. *Samyak dagda*
4. *Atidagda*

Plusta dagda^[7]

तत्र यद्विवर्णं प्लुष्यतेऽतिमात्रं तत् प्लुष्टं | (Su.Su12/16)

A burn characterized by

- Discoloration of its site,
- Extreme burning sensation
- Marked by absence of blister

Chikitsa of plusta dagda^[8]

प्लुष्टस्याग्निप्रतपनं कार्यमुष्णं तथौषधम् |

शरीरे स्विन्नभूयिष्ठे स्विन्नं भवति शोणितम् ||

प्रकृत्या ह्युदकं शीतं स्कन्दयत्यतिशोणितम् |

तस्मात् सुखयति ह्युष्णं ननु शीतं कथञ्चन || (Su. Su. 12/20-21)

उष्णक्रिया - उष्णं तथौषधमिति आलेपनान्नपानादिकम् |

- Alepa should be done with ushna veerya dravyas.
- Ushna anna pana should be given.

Durdagdha^[7]

यत्रोत्तिष्ठन्ति स्फोटास्तीव्राश्चोषदाहरागपाकवेदनाश्चिराच्चो

पशाम्यन्ति तद्दुर्दग्धं | (Su.su. 12/16)

- A burn with eruption of large vesicles or blisters
- assumes red color, pain, burning sensation, supuration
- takes long time to heal

Chikitsa of Durdagdha

शीतामुष्णां च दुर्दग्धे क्रियां कुर्याद्भिषक् पुनः |

घृतालेपनसेकांस्तु शीतानेवास्य कारयेत् | (Su. Su. 12/22)

Ghrita, alepa, seka should be done with sheeta only

Samyak dagdha

सम्यग्दग्धमनवगाढं तालवर्णसुसंस्थितं

पूर्वलक्षणयुक्तं च | (Su. Su. 12/16)

- A burn which is superficial
- Talaphala varnata (Fruit of tala tree – Asian palm fruit)
- Susamsita vrana (without elevation or depression)

Chikitsa of Samyak Dagdha

Alepa-should be done with Ghirta prepared with Tugaksheera, Plaksha, Chandana, Gairika and Amrutha. Pralepa - with Mamsa of Gramya, Anupa, Auduka animals.

If there is more daha – pitta vidradhi Chikitsa is done.

Ati dagdha^[9]

अतिदग्धे मांसावलम्बनं गात्रविश्लेषःसिरास्नायुसन्ध्यस्थि

व्यापादन.. (Su. Su. 12/16)

A burn in which the muscular and connective tissue hangs down, veins, nerves and bones are destroyed

UPADRAVA

अतिमात्रंज्वरदाहपिपासामूर्च्छाश्चोपद्रवा भवन्ति, व्रणश्चास्य

चिरेण रोहति, रूढश्च विवर्णो भवति | Su Su 12/16

Fever, burning, thirst, fainting
Complications, that which leads to
a permanent disfiguration of the body
And retarding the healing of the incidental
Ulcer by leaving a discolored scar
Even after healing,

Chikitsa of Atidagdha^[9]

In this there will be Mamsa Visheerana, so that has to excised followed by Sheetala Kriya.

Pralepa should be done with Tandula, bark of Tinduki kashaya mixed with Ghirta and then cover the wound with Guduci Patra or by any aquatic plant leaves.

Pittaja visarpa chikitsa has to be adopted

Dhoomopahata lakshana^[10]

- श्वसिति
- क्षौति
- कास
- चक्षु – परिदाह, राग
- Perception of smell and taste are lost
- श्रुतिश्चास्योपहन्यत – impaired hearing
- तृष्णा दाह ज्वर मूर्च्छ

Chikitsa of Dhoomopahata^[10]

- Vamana in the form of Ghrita mixed with Ekshu Rasa, Draksha, Ksheera, Sharkara Jala or with Madhura and Amla Rasa Dravyas. Because of Vamana there will be Kostha Shuddhi
- By this even the symptoms like Jwara, Daha, Murcha, Swasa, Kasa will reduce.
- Kavala Graha: - Should be done with Madhura, Lavana, Amla, Katu Dravyas.
- Sirovirechana: - By this person attains clarity of Sense Organs.
- Ahara: - which do not cause Daha, which are Laghu and Snigdha

IndravajraAgni Dagdha^[11]

इन्द्रवज्राग्निदग्धेऽपि जीवति प्रतिकारयेत् |

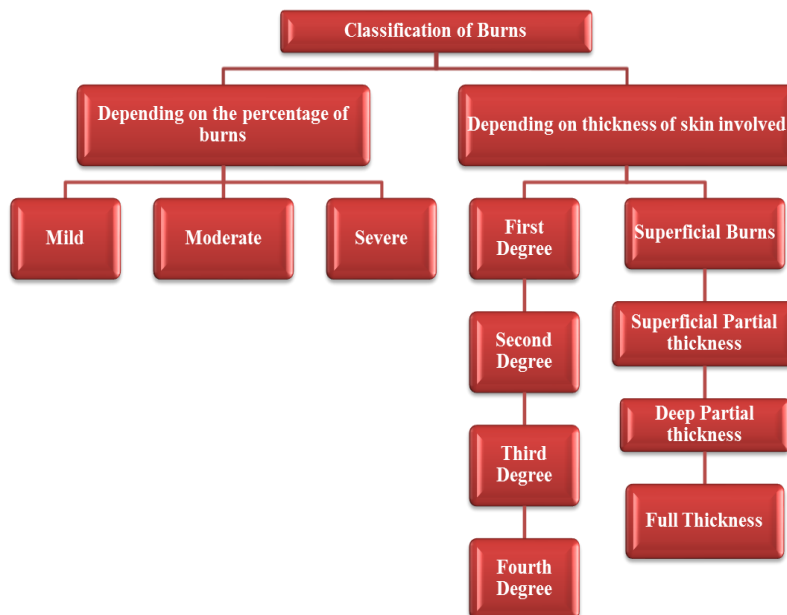
स्नेहाभ्यङ्गपरीषेकैः प्रदेहैश्च तथा भिषक् || (Su. Su. 12/39)

Burns due to thunderbolt / lightning.

Management - Patient will not survive. If by chance patient survives then he should be treated with Sneha Abhyanga, Pariseka, Pradeha.

BURNS

Burns is a type of coagulative necrosis caused by heat, transferred from the source to the body.

CLASSIFICATION OF BURNS^[12]**First degree burns**

- Superficial burns
- A typical first degree burn is a sun burn or superficial scald. This type of injury does not included in calculation of TBSA.
- Cause-Sunburn, Low-intensity flash
- Skin involvement- Epidermis
- Symptoms- Redness of skin, Epidermis looks red and painful, No blisters
- Heals rapidly in 5-7days by epithelialization without scarring.
- It shows capillary filling

SECOND DEGREE

- Superficial partial thickness
- Cause - Scalds Flash flame, Contact burns, chemical
- Skin involvement- Epidermis, upper dermis
- Manifestations- Blisters that are red, shiny. Severe pain caused by nerve injury mild to moderate edema
- No blanching
- Recovery in 2 to 4 weeks, some scarring and depigmentation

THIRD DEGREE

A deep partial thickness

Cause -Flame, Prolonged exposure to hot liquids
Electric current, Chemical

Skin involvement- Epidermis, entire dermis, and sometimes subcutaneous tissue

Manifestations- Dry; pale white, Leathery, visible thrombosis blood vessels

Painless, all skin elements and local nerve endings are destroyed, surgical intervention required for healing

FOURTH DEGREE

- Full thickness burns

- It involves total destruction of the
- Epidermis and dermis.
- The burned areas are painless.
- Prolonged exposure or high voltage electrical injury
- Deep tissue, muscle and bone involved

MILD

- Partial thickness burns <15% in adult or <10% in children.
- Full thickness burns less than 2%.
- Can be treated on outpatient basis.

MODERATE

- Second degree of 15-25% burns (10-20% in children).
- Third degree between 2-10% burns.
- Burns which are not involving eyes, ears, face, hand, feet, perineum

SEVERE

- Second degree burns more than 25% in adults, in children more than 20%.
- All third degree burns of 10% or more.
- Burns involving eyes, ears, feet, hands, perineum.
- All inhalation and electrical burns.
- Burns with fractures or major mechanical trauma

Pathophysiology^[12]

Due to injury, Heat causes coagulation necrosis of skin and subcutaneous tissue which lead to release of vasoactive peptides. Because of this there will be altered capillary permeability which further leads to Loss of fluid and Severe Hypovolemia. Hypovolemia leads to Decreased cardiac output which leads to altered pulmonary resistance, Decreased Myocardial function and Decreased Renal blood flow (Oliguria) which further leads to SIRS and MODS.

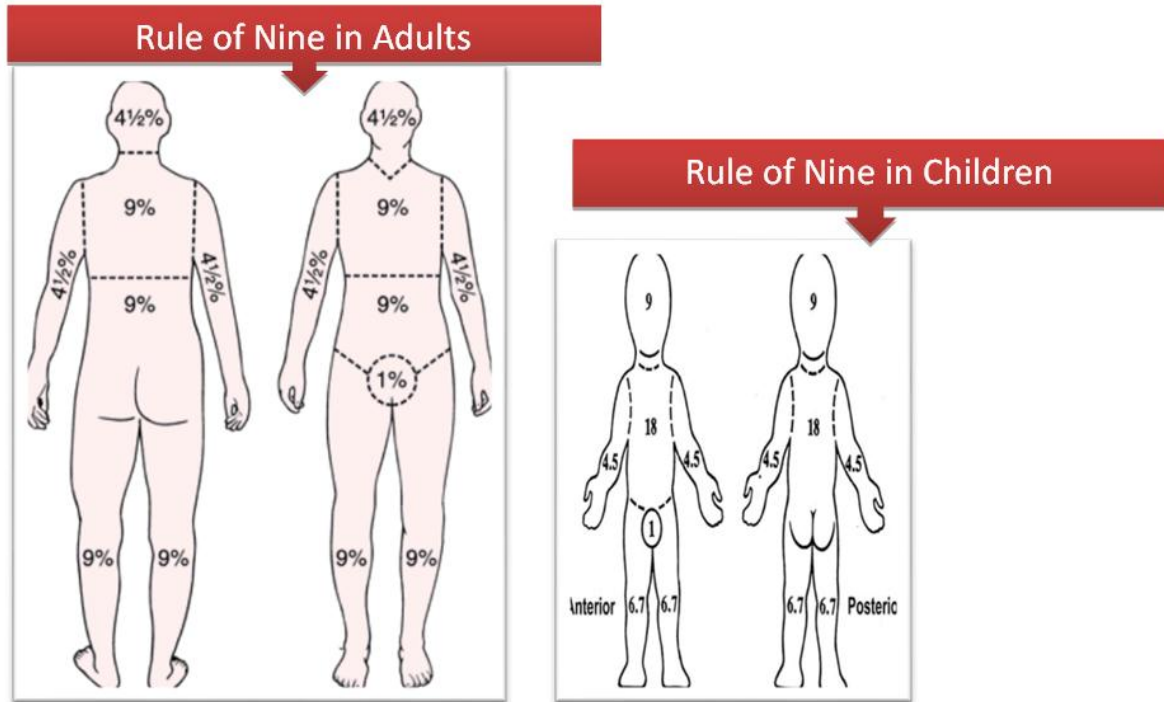
Assessment of burn wound ^[13,14]

- By Extent of TBSA injured
- Rule of nine
- Palm method
- The Lund and Browder method

- The system assigns percentages in multiples of nine to major body surfaces.
- The ‘rule of nines’, which states that each upper limb is 9% TBSA, each lower limb 18%, the head and neck 9%, can be used as a rough guide to TBSA outside the hospital environment

Rule of nine

- It is the quick way to estimate the extent of burns.



Palm method

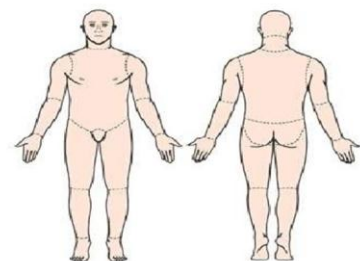
- In patient with scattered burns, the palm method may be used to estimate the extent of the burns.
- The size of the patient palm is approximately 1% of the TBSA

anatomical parts especially the head and legs, changes with growth.



Lund-Browder Chart

Head	7
Neck	2
Ant. trunk	13
Post. trunk	13
R. buttock	2 1/2
L. buttock	2 1/2
Genitalia	1
R.U. arm	4
L.U. arm	4
R.L. arm	3
L.L. arm	3
R. hand	2 1/2
L. hand	2 1/2
R. thigh	9 1/2
L. thigh	9 1/2
R. leg	7
L. leg	7
R. foot	3 1/2
L. foot	3 1/2
TOTAL	100%



Lund and Browder method

The more precise method of estimating the extent of a burn in the Lund and Browder method, which recognise that the percentage of the surface area of various

Diagnostic evaluations

- History taking
- Physical examination
- ABG analysis
- Na, K, Cl
- CBC

- Bleeding time and clotting time
- RBS, creatinine
- ECG,
- Chest Xray
- Carboxyhemoglobin

Pre Hospital Management^[14,15]

- Remove patient from source of injury
- Stop burn process
- Burning clothing, jewelry, watches, belts to be removed
- Pour ample water on burnt area (ice packs – skin injury & hypothermia) Small thermal burns (<10% TBSA) may be covered with a clean, tap water-damped towel for patient comfort and protection until definite medical care instituted
- Cooling of injured area within 1 minute helps minimize the depth of injury
- If the burn injury is large (>10% TBSA) it is not advisable to immerse the body part in cool water since doing so might lead to extensive heat loss
- Do not break blisters
- Do not apply lotions, powders, grease, gentian violet, calamine lotion, butter and other sticky agents over the burn wound
- Prevent contamination: Wrap burn part in clean dry sheet /cloth.
- Assess for life threatening injuries.

Initial Management

- Clothing should be removed
- Cooling of part by running water for 20min
- Cleaning the part to remove dust,mud etc

- Chemoprophylaxis-tetanus toxoid,antibiotics,local antiseptics
- Covering with dressing by different methods
- Comforting with sedations and painkillers

Definitive Treatment

- Admit the patient
- Maintain airway, breathing, circulation (ABC)
- Assess the percentage ,degree, and type of burn
- Keep the patient in a clean environment
- Sedation and proper analgesia
- Patient should be in burns unit (ideally air conditioned) with all aseptic methods

General Treatment

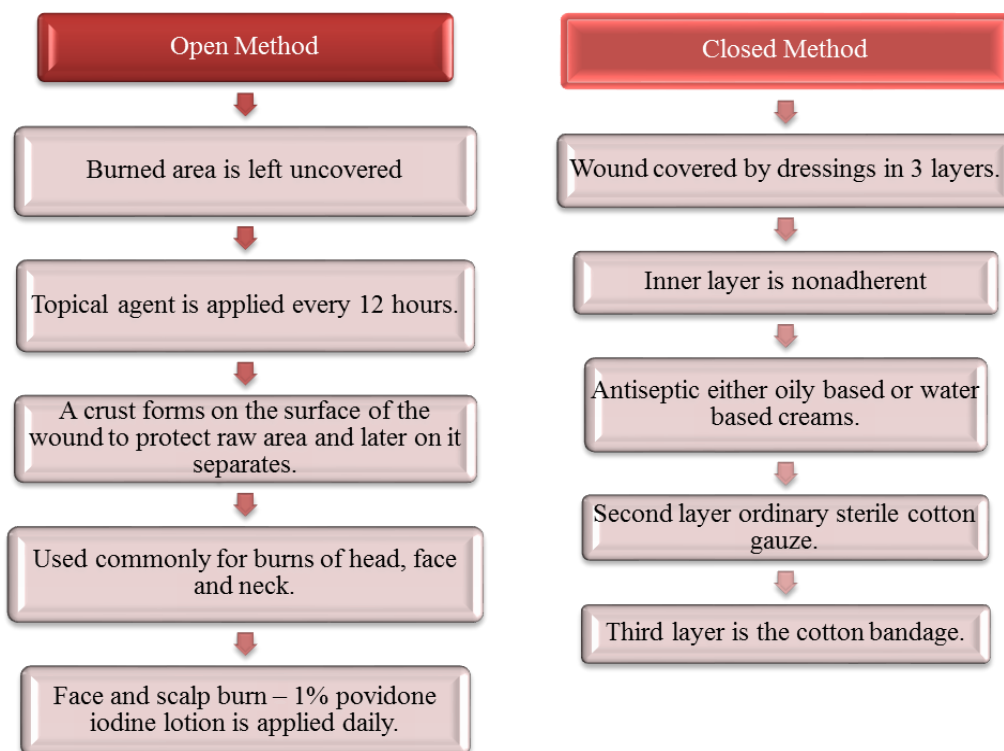
- Tetanus prophylaxis
- Antibiotics
- Gastric decompression
- Wound care
- Escharotomy
- Fasciotomy
- Skin grafting
- Fluid replacement
- Nutritional support

Wound Care

Wound care should be delayed until a patent airway, adequate circulation and adequate fluid replacement have been established.

2 types of wound treatment used to control infection

1. Open method
2. Closed method



Prevention of infection and wound care

Burn wounds are frequently monitored for bacterial colonization

- Wound swab cultures and biopsies
- Cleanse and debride the area of necrotic tissue that would promote bacterial growth

Wound / skin grafting

If wounds are deep (full-thickness) or extensive, spontaneous re-epithelialization is not possible.

Therefore, coverage of the burn wound is necessary by using patients own skin or other methods. (Isografts, allografts, xenografts)

Escharotomy

- It is the surgical division of the nonviable skin and tissues
- Eschar – tough leathery black tissue remaining after full thickness burns
- Epidermis and dermis –destroyed with sensory nerves in dermis.
- Performed as prophylactic measure ,to release pressure and facilitate circulation
- Deep 2nd & 3rd degree circumferential burns
- Chest: To allow respiratory movement

- Limb: To restore circulation in limb with excess swelling under rigid eschar
- Not in SC tissue -Exposes SC fat

Fasciotomy

Sometimes escharotomy may not result in improvement of blood flow to the peripheral part in these cases fasciotomy is required.

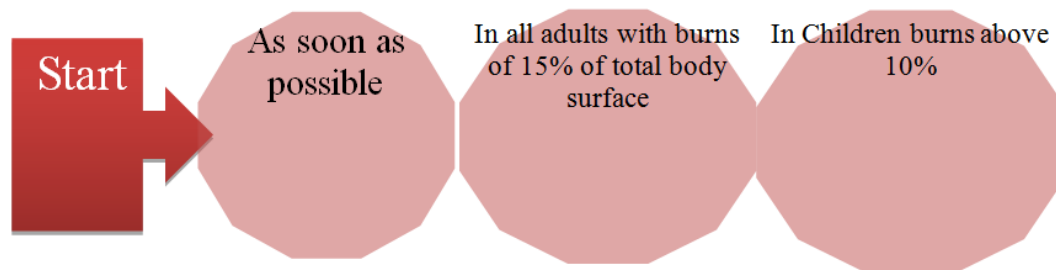
Also required in severe burns with extensive damage to the underlying fat and muscles.

Nutritional therapy

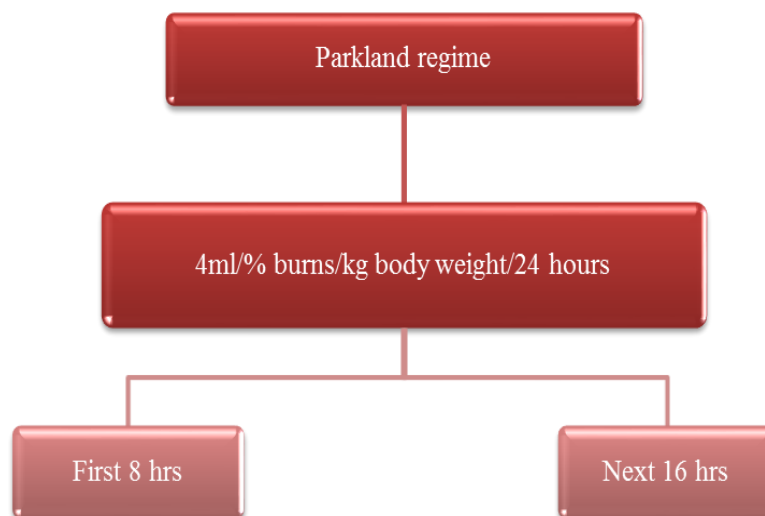
- High-protein & high-calorie diet
- Often requiring various supplements Routes:
 - ORAL (BEST)
 - Enteral -Gut is the preferred alternative route
 - G-tube or J-tube (Head injury/ surgery/ unconscious)
 - Parenteral TPN and PPN

Treatment of shock^[16]

- 1) Sedation
- 2) Maintenance of airway
- 3) Fluid resuscitation



- First 24 hours Crystalloids
- After 24 hours upto 30 – 48 hours colloids should be given to compensate plasma loss

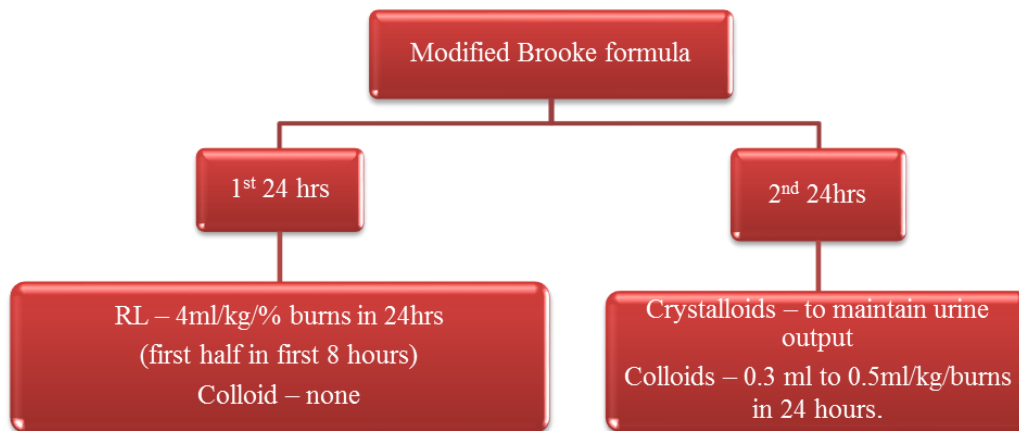
Formulas to calculate the fluid replacement changes^[17]

Fluid loss management

- The rate and amount of transfusion as well as efficacy of intravenous resuscitation are assessed by repeated red cell volume and haemocrit and at the

same time by hourly monitoring of vital signs, general condition and urinary output.

- Urinary output = 30-50 ml/hour

**Inhalation Burns**

- It is due to
- Inhalation of heat
- At the site of fire, oxygen concentration is less than 2% which can cause death in 45 seconds due to hypoxia.
- Inhaled carbon monoxide binds with Hb immediately to form carboxy haemoglobin causing severe anoxia and death.
- CO has got more affinity for haemoglobin than oxygen. Carboxy haemoglobin in blood more than 10% is dangerous; more than 60% is life threatening.
- Smoke contains hydro cyanide which causes tissue hypoxia and profound acidosis.

Clinical features

- Low oxygen saturation.
- Charring of mouth, oropharynx with facial burns.
- Carbon sputum.
- Change in the voice, singed facial and nasal hair.
- Decreased level of consciousness with stridor or dyspnea.
- After 3 to 5 days, ARDS and hypoxia develops.
- Bronchopneumonia with septicemia occurs after 5 days.

Management

- Take out the patient from the site.
- Ventilation should be given.
- Antibiotics.
- Oxygen supply.
- Tracheostomy whenever needed.
- Bronchodilators like albuterol
- Hypertonic saline inhalation induces the effective coughing to remove casts.

- Should monitor the patients with arterial blood gas analysis regularly.

Electric Burns^[18]

- It is caused by heat that is generated by the electrical energy as it passes through the body.
- Direct damage to nerve and vessels causing tissue anoxia and death can also occur.
- It can result from contact with exposed or faulty wiring or high voltage power lines.
- The skin is involved at 2 points
- At the point of contact with the electrical source
- At the site of exit at which the
- Patient is grounded.

Site of accident

- Workplace for most adults – Electricians, construction workers
- Home for children – objects inserted into wall of sockets eg; pins, keys and fingers
- Lightning injury in nature

Types of electrical injury**High – voltage injuries**

- >1000 volts
- Not only causes direct injury at the point of contact but also damages tissues that conduct the electricity through the body.

Low –voltage injuries

- Less than 1000 volts.
- Produces direct injury at the point of contact.
- Skin and subcutaneous tissue are involved.
- Even Muscle and bone beneath the cutaneous burn may also be damaged

Lightning strike

- Upto 2 billion volts
- Direct current
- Asystole
- Tetany
- Variable tissue damage

Treatment of Electrical injury

- Adequate fluid replacement
- If myoglobinuria – mannitol may be added to each liter of RL
- If cutaneous injury – debrided, cleared and topical antimicrobial burn creams are applied.
- Absence of peripheral pulses distal to the site of injury – immediate exploration
- Evaluation of the limbs for compartment syndrome – may require fasciotomy
- Nutritional support

Lightning Injuries^[19]

Lightning injuries are injuries caused by lightning strikes.

- Much less energy imparted in lightning strikes.
- Therefore much less injury.
- While sudden death is common because of the huge voltage of a lightning strike.
- The body's electrical system may be short-circuited resulting in cardiac and respiratory arrest, tinnitus, and paralysis.
- Deep burns or myoglobinuria may not be seen.

Lightning can strike or injure humans in four different ways

- 1) Direct Strike
- 2) Contact - Person touching object struck
- 3) Splash - lightning jumps from its pathway and patient becomes pathway
- 4) Ground current - current spreading radially through the ground

Treatment- same as that of electrical injuries

Complications of burns

- CVS- dysrhythmias and hypovolemic shock
- Resp- upper Respiratory tract injury, pulmonary edema, ARDS, pneumonia
- urinary- Acute Tubular necrosis,
- Infection – sepsis
- curlings ulcer
- Contracture

Contracture in Burn wound

- Contracture in burns can occur anywhere.
- It is more common wherein flexibility and mobility is present like along the joint, eyelids, cheeks, lips, neck, elbow, and knee.

Prevention of development of contracture

- Joint exercise in full range during recovery period of burns.
- Pressure garments for a long period.
- Topical silicon sheeting.

DISCUSSION

- Agni Dagdha vrana is considered as severe form of trauma which affects the mankind.
- Its understanding can be done with burn injuries and Acharya Sushruta has explained it under Itaratha Dagdha.
- Sushruta has explained 4 types of Dagdha Vrana like Plusta Dagdha, Durdagdha, Samyak Dagdha, Atidagdha according to its symptoms and it can be correlated to first degree, second degree, third degree, fourth degree burns respectively.
- Where in first degree burns there will be only involvement of epidermis of skin and the symptoms like redness of skin, and pain will be there, these symptoms are same as that of Acharya Sushruta's explanation of Vivarnata and Daha.
- In second degree burns there will be involvement of epidermis and part of dermis. And the symptoms like Shigra Sphota that is blister formation, redness is seen.
- Third degree burns destroys the epidermis and dermis so the skin will be charred even this has been explained by Sushruta that the affected area will be like Tala Phala (blue black).
- In Fourth degree burns the deeper structures bones, muscles, tendons are involved and the same has been explained by Sushruta.
- Sushruta has even explained about Dhumopahata, inhalation injury and burns occurring due to natural calamities like lighting, thunderbolt.
- Effective management has been explained by Sushruta for all types of burns.

CONCLUSION

- Acharya Sushruta has elaborately explained about Dagdha Vrana and its management, by this it is evident that the burn injuries are common since years and were treated successfully.
- Effect of Burns may cause simple to severe consequences. Depending on its cause and symptoms it may require local treatment to immediate emergency medical care.
- Acharya Sushruta has explained different types of burns having different causes and has elaborately explained about its management also. The explanation which Acharya has given is very scientific and practical even at this era

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