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Burns are notorious in the sense that they break the continuity of skin and produce great raw areas. Burns are the ischaemic wounds, where confluent thrombosis which involves arterioles, capillaries, venules and at times even larger vessels is characteristically present especially in full thickness. In partial thickness burns thrombosis is incomplete, the dermal circulation is deeper, viable segment of the dermis is gradually re-established within a few days, although the dead superficial portion of the dermis of course remains avascular.

Because of wound ischaemia, systemically administered antimicrobial agents are not reliably delivered to the site where they are needed by the vascular routes, as diffusion from the wound peripherally, for a variable but often considerable distance is their only means of access, moreover the wound surface close to the heat source is at once the most severely injured and ischaemic and as well as the original site of most burn wound infections. Topical agents are therefore best used to treat burns.

Normal skin harbours few pathogenic bacteria. Most burns are sterile initially, although contamination
usually by soil or water or dirty linen may occur after accident. Because of the greater raw area burn wounds are more prone for invasion by micro-organisms. In large burn areas, dense colonization of pathogens can occur within 24 hours. In untreated patients, immediately after injury few bacteria can be recovered and these are predominantly gram positive. The type and density of organisms present in the untreated burn wound change with time, so that by the fifth post-burn day, pseudomonas can be recovered. By the middle of second post burn week the burn wound organisms are predominantly gram negative, the organisms penetrate the eschar by migration and extend down to viable - non-viable tissue interface. At this site further microbial proliferation commonly occurs and promotes lysis of denatured collagen and spontaneous slough of eschar. In patients with inadequate host defence capacity or those in whom the topical therapy is ineffective, the sub-eschar organisms invade the underlying non-burn tissue and may spread systemically. Adequate topical therapy should therefore be instituted as rapidly as possible following injury. Topical wound therapy in patients with large burn is equally as urgent as need as is fluid resuscitation.

The water retaining ability of the skin depends on its effective vapour pressure and the diffusion barrier offered by keratin layer and lipid contents in the stratum
corneum. This lipid is thermo-labile and this barrier is removed after thermal injury, the effective vapour pressure gradient is increased by 15-20 times. This results in a large amount of evaporative water loss amounting to an increase to 3-10 times the normal rate of insensible water loss i.e. 40 ml/hour. The amount and duration for which the loss persists depends on the depth and percentage of burn.

Therefore, among the main aims in the treatment of burn is to re-establish the continuity of skin. In superficial burns healing may occur spontaneously but the danger of conversion of superficial burn to deep burn by infection and/or dessication and loss of body constituents remains a major problem and therefore coverage of raw area becomes necessary. Topical burn therapy most likely began after man's first adverse encounter with fire. Initially there was no knowledge of the existence of bacteria or of the immune response, or of the ischaemic nature of wounds and topical medicaments were intermittently applied to burn areas to relieve pain and to enhance the healing. The widely empiric remedies of prelisterian era were of course excusable because they were conceived in ignorance. Fortunately, enough knowledge now is exists to permit a rational evaluation of agents currently available or newly proposed in the treatment of burns.
The concept of temporary biological dressings was introduced in 1930 by Brown. Homografts and heterografts split thickness skin have both adequately served the functions required of a biological dressing. In 1953, Brown et al reported that it was practical to use post-mortem homografts as biological dressings. Since then, cadavers have provided the usual source for homografts. Heterografts have not proved as effective as homografts in decreasing bacterial contamination of the wounds.

Amniotic membranes were chosen for evaluation. It is not necessary to point out how easy and impersonal it is to obtain this widely distributed human material which at present seems to find its only destiny to be "thrown into the bucket", especially if it is normal. It has been stated that since amniotic membrane is formed by the ectoderm of the foetus, it is like an extension of the body skin.

Amnion, chorion and the combined foetal membrane have been used by various investigators as a substitute for skin in the past. Since Sabella's first case describing the use of amniotic membrane in the burn wound 50 years ago, multiple reports have appeared in the world's literature. Most of these were reporting the attempts to use amniotic membrane as a permanent substitute for skin autografts or as a dressing over partial thickness burns.
Dahinteroa and Dobikovsky observed failure when amniotic membranes were applied in deep burns or on severely infected areas. They pointed out that the membranes became autolyzed in 48 hours and disintegrated. Furthermore, they stated that the same was true on all granulating surfaces even if they were clean. Similar findings have been reported by others. In these cases, the membranes were changed every 48 hours. As demonstrated by Whuck & Mancrifer (1958) for homograft skin in a less tidy wound, more frequent changes prevent collection of purulent material under the biological dressings. This allows firm adherence of the membrane to the underlying granulation.

Frequently changed amniotic membranes were more successful in decreasing the bacterial count in contaminated rat burns than human skin. This raised the question as to whether there was a substance in amniotic membrane which was specifically antibacterial. One such possibility is allantoin which is known to exist in amniotic membrane. Another possibility is lysozymes, a bacteriolytic protein of low molecular weight which is present in amniotic tissue. Rubin & Bargiovi recently stated that skin itself possesses bactericidal substances in its biological make-up such as lysozymes and certain fatty acids. Neither, however, could demonstrate bacterial inhibitory activity of split thickness human skin in vitro when measured by a disc sensitivity technique.
Another hypothesis for the observed decrease in the bacterial count under the amniotic membrane lies in the intimate biologic closure of the open wound by membrane restoration and the functional circulation through the covered granulations allows a more rapid turnover of phagocytes, serum bacteriolytic factors and may actually accelerate the removal of necrotic debris. Therefore, repeated applications of the membranes allow the host resistance factor in the granulating bed to function at peak efficiency. The increased antibacterial effects seen with the amniotic membrane may be due to the fact that it is less well differentiated than skin.

The amniotic membrane fulfilled all the functions of an ideal biological dressing. In terms of their larger size and ready availability at no cost to the patient, they are actually superior to homograft and heterograft skin. Chao et al and Troensegaard possess some specific healing power. They have reported a stimulation of fibrous tissue growth and more rapid epithelial repair. In the present study, it has been noted that pain and discomfort disappears immediately after application of amniotic membrane and no further analgesics or sedatives were required after the dressing. Occasionally sedative was required for psychological support. No allergic symptoms like rigor, rash, vomiting and giddiness were noticed even after close watch. These findings are comparable
with the published reports of other workers. Cause of disappearance of pain and discomfort is coverage of exposed nerve endings.

It has been observed that amniotic membrane adhered and became dry in 6 - 8 hours in hot and dry atmosphere and in 12-24 hours in cold and wet atmosphere. Adherence has been proposed to be most important property of biological and synthetic materials applied to de-epithelialized surfaces. It reduces pain, bacterial contamination and consequently optimize the rate of healing. Most prosthetic grafts rely on the endogenous adhesive fibrin for adherence. This property of material is therefore determined by the strength of bone that it forms with fibrin. Studies have demonstrated that fibrin binds preferable to collagen in normal skin.

In most of superficial burn cases with mild contamination, where membrane was applied after proper cleaning. No soakage was seen. Cases needed only one application and healed quickly.

A wide number of antimicrobials have been used from time to time, but almost all of them have been abandoned in favour of Silver Sulfadiazine which has a wide spectrum of action against organisms including Staph aureus, E. coli, Proteus, Pseudomonas, Enterobacteria and Candida albicans and at the same time has
minimal side effects. Thus, it was logical to choose this as the parameter to judge the effectiveness of the combination of PVP + N.

Local polymyxin + Neomycin + Bacitracin (Neosporin) and Povidone iodine (PVP) combination form an almost complete barrier against colonization by pseudomonas pyocyaneus but not so against staphylococcus aureus and haemolytic streptococci. Povidone iodine on the other hand has a wide antibacterial antifungal sporicidal and viricidal properties. Neomycin and Bacitracin supplement this action especially in relation to gram negative organisms.

Literature recommendations cite a bacterial count of $10^5/CM^2$ of tissue as the upper limit below which deeper penetration is minimal. Our study using PVP + N showed an appreciably better percentage of sterile cultures as compared with SSD both at 7 days (56.0%) and 18 days (64.0%) of post burn. Similarly, the numbers of cultures below $10^5/CM^2$ were significantly less for PVP + N at 18 days. Even patients with a count of more than $10^5/CM^2$ were less in the group treated with PVP + N. These figures agree with other studies. Thus, Moncrief (1958) has shown 40% sterile cultures and 84% less than the critical level of $10^5/CM^2$ in a study of more than 3200 bacterial cultures which compare well with our
corresponding values of 64.0% and 96.0% on day 18 using PVP + N. Zellner & Bugyi (1985) too have shown better results with PVP as compared to SSD. Our results which are markedly better than other studies with only PVP are due to the addition of Neosporin.

The rate of healing also showed a marked improvement of SSD in both superficial and deep burn categories. The tanning effect of PVP is an added advantage for this keeps the surface dry so holding colonization to a low level and also permitting early surgery. PVP + N combined forms a "crust" which sets up a barrier to colonization and at the same time keeps the surface dry. In patients with superficial burns when epithelization was complete, the crust separated itself and in clean cases no single incidence of infection was found.

In deep burn wounds, multiple injections of PVP subescharally helped in two ways. In the first phase, it kept the subescharal bacteria count to a low level. In fact this bacterial colonization and its inaccessibility to topical antimicrobials have been major factors in burn wound sepsis of deep burns. That subescharal injection of PVP was beneficial was evident from the results, namely no single septicaemic mortality occurred in deep burn patients. The second beneficial effect is that it
opens up a subescharal plane thus helping in early escharolysis and decreased bleeding on separation. The burn wound in most of these patients could be grafted immediately after the eschar separation which was in marked contrast to the fact that topical agents are totally ineffective in subescharal colonization including superficially applied PVP cream and also that after escharectomy or lysis a considerable period of time is spent in limiting the infection at the burn site, before grafting can be taken up. Subescharal PVP injections were attempted basically because PVP has been shown to have beneficial antibacterial effects when used subcutaneously, intra-peritoneally or intra-pleurally without any serious iodine toxicity. The concentration of 0.25% PVP may seem to be too low for it to be effective but it has been mentioned that with this concentration there is an increase in free iodine and antibacterial activity. None of our patients showed any clinical evidence of iodine toxicity. The PVP injections in deep burns of more than 50% were limited to three in order to limit the total amount of PVP injected. We found that subescharal injections markedly reduce the incidence of septicaemia and mortality in these patients and at the same time keep the surface healthy. Application of PVP + N was accompanied by minor pain, but what was most important was that pain accompanying repeated dressing of SSD or
other topical agents was not seen basically because this was an open method and did not require removal of previously applied layer. This in our view is an important psychological and clinical advantage and at the same time saves a lot of nursing personnel time. The iodine levels are elevated after PVP application but this level creates no significant impairment of thyroid functions or manifestations of iodine toxicity. Further iodine levels return to normal within a week after applications are stopped. Similarly, the repeated serum creatinine compared with those of patients being treated with SoD showed that no toxicity because of the drug contained in Neosporin mainly bacitracin and Neomycin which are really toxic. This was probably because after the three and two applications on day one and two, subsequent applications were limited to only those areas which were denuded, thus largely limiting the total amount of drugs used to a bare minimum. Even the PVP solution used compared favourably with PVP ointment commonly used in terms of the lesser amount of PVP used.

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