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Burns are notorious in the sense that they break continuity of skin and produce a raw area. The water retention ability of skin depends on its effective vapour pressure and diffusion barrier offered by keratin layer and lipid contents in the stratum corneum. This lipid is thermolabile. When this barrier is removed after thermal injuries, the effective vapour pressure gradient is increased by 15-20 times. This results into a larger amount of evaporative water loss amounting the increase to 3-10 times. The amount and duration to which the loss persists depends on the depth and percentage of burn.

The loss of blood flow which occurs initially, starts returning towards normal after 24 hours as patent vessels reappear. The process of revascularization is associated with local circulatory stasis. This stasis makes the wound vulnerable to desiccation and infection. Either of these can trip the balance converting it to a zone of necrosis or full thickness burn. The infection is the main factor for mortality and morbidity during hospital stay and afterwards in the form of discolouration, scar formation and contractures.

Therefore the main emphasis, in the mana-
epithelial cells preserved for repithelization, is an
covering the raw area and thus making it a close wound
which subsequently reduces excessive evaporative water loss
and prevents wound infection.

The autografts are best to cover the raw area but these have limitations particularly when the area
is large, patient is not fit for surgery and the patient or
relatives do not consent for it, on religious, sentimental
or ethical grounds. Alternatively homografts are used but
here again availability is limited. Other biological
covering materials are allograft skin, hetrograft skin,
collagen sheet, fetal membranes. The cadaver skin is in
limited supply in general hospitals. Secondly they are very
expensive and thus not feasible for a poor country like
 ours. Baxter has estimated that six physician hours and
hospital cost of $ 225 are needed per patient for cadaver
skin grafting.

The present work is a study of effects of
two bio-dressing coverage over superficial burns and to
assess the superiority of either of them. This study was done
over the patients of superficial burns of less than 50% of
body area involvement without considering the factors of
age, sex, occupation, socio-economic status inhabitants,
sex and cause of burn and contamination of wound.

As regards the incidence of burn no
significant difference was observed in sex and inhabitancy. Significantly it was observed that females were more sufferer the males in the age group of 15-30 years. In our country the females of this age group are housewives in middle class families. They are indulged maximally in house hold work and thus are more liable to thermal injury by fire appliances. It is in accordance with other studies published from time to time. According to place of birth females were 2½ times more sufferers in indoor thermal injuries and males were 4½ times more sufferers in outdoor thermal injury. 90% cases were below 30 years of age and 60% were children and women.

In this study it was significant to note that most of the cases i.e. 63% reached the hospital within 24 hours of accident irrespective of distance of site of fire accident from hospital. This signifies the amount of sufferings and anxiety of thermal injury. The 13% cases came after 48 hours of accident irrespective of distance and percentage of burn.

In the present study 41 cases were studied after application of three types of dressing. Two of them were biological dressings (Amniotic membrane and Collagen sheet) and third was antibiotic gauze pieces. The amniotic membrane was applied over full burn area in 12 patients (Group A), one part of burn area 17 patient (Group C₁-X₄), out of these 17 patients the remaining burn area was
treated with antibiotic gauze pieces in 3 cases ($E_2$) and with collagen sheet in 14 cases ($E_1$). This makes total of 29 surface areas where amniotic membranes were applied. The collagen sheet was applied over burn in 26 patients. Nine of them were the patient where it was applied over full burn area ($B$) and 17 ($D_1 + E_2$) were the patients where it was applied over part of burn cases. The remaining part of burn surface was covered with amniotic membrane in 14 cases and with antibiotics gauze pieces in 5 cases ($B_2$). Thus making the total of 26 areas where collagen sheet was applied.

Amniotic membrane is the inner one of two fetal membranes. It is thin, transparent, elastic and strong which can cover a wide surface area. It consists of five layers histologically. It is derived from epithelial and is continuous with ectoderm of embryo. The collagen sheet is a product made from animal tissue rich in collagen such as aorta and sub mucous layers of cecum and intestines, pericardium and amniotic membrane. It is thicker than amniotic membrane. It is hazy, elastic and stronger. Each sheet is 6" x 4" in measurement and rectangular in shape.

Pigeon (1960) described amniotic membrane like an extension of body skin and therefore a good substitute for autograft skin in superficial burn. Dine (1963) stated that amniotic membrane is a base graft that resembles the skin being a direct continuation of fetal
integument along the umbilical cord. The role of amniotic membrane has been evaluated experimentally as well as clinically. Sabella (1973) was the first person to use an amniotic membrane in the treatment of burn. Many workers found it useful as coverage material in superficial and deep burns. In deep burns it has to be changed from time to time. The collagen sheet has already been used with extremely good results both in experimental and clinical studies by a number of surgeons in the country. As a dressing material it has already been used in different condition such as in traumatic wound with skin loss, infected and uninfected superficial or deep burn, donor area after skin grafting, experimentally produced raw area, in the posterior wall repair of hernia, as a muscular cover in oral cavity and to gap the abdominal defects. Sinha et al (1973), Shanker (1975), Jain et al (1976) used collagen sheets as primary cover material in the management of burn. Later Srivastava (1978), Gupta et al (1978) found the collagen sheet as effective bio-dressing.

The availability, preservation and application of amniotic membrane are very simple and easy. It can be obtained fully prepared for application from clean labour rooms and obstetrics operation theatres at the time of child birth without any cost. It is, in intact form, attached with chorion and placenta and can be separated from them after washing out blood and placental material.
It can be applied freshly or can be preserved easily in sterile normal saline treated with 10 lac units of benzyl penicillin and 1 gram of streptomycin sulphate up to 1 month in refrigerator. Although it was discarded after 1 month of the preservation but there were no sign of disintegration. The application of amniotic membrane is also very simple. It can be applied over burn surface after debridging it in surgical 0.P.D. or indoor wards under sedation. It can be left open or can be dressed for 12 hours to retain it on wound surface.

Availability and preparation is not that simple in the case of collagen sheet though attempts are now being made for the transfer of know-how to a suitable entrepreneur for its commercialization. It is costing Rs. 5/- for one sheet of 6"x4" size. It is prepared from collagen in organs of slaughtered animals after cumbersome processing in Central Leather Research Institute Adyar, Madras. It is preserved in glass ampoules in preserving fluid containing ethylene oxide for years. The application of collagen sheet is simple and can be done in surgical 0.P.D. and indoor wards under sedation after gentle debridement of wound. The dressings to cover and retain the sheet were applied in every case.

It has been shown that the bacterial growth decreases most effectively when the temporary bio-dressing ‘take up’ on granulating wound. But in
Superficial burn vascularization and 'take up' is not desirable and it is hoped that the more dense, uniform cuboidal surface of amnion discourages the penetration of fibroblasts. Graham, using the amnion alone for partial thickness defect, has shown that initial 'take' does not occur. The tough collagen sheet also discourages the penetration of fibroblast and capillaries.

In the present study it has been noted that pain disappeared in all 25 'take up' areas out of total 29 areas. Probably coverage of exposed nerve endings by the membrane is responsible for disappearance of pain. Out of 3 cases where pain persisted after amniotic membrane application 2 were grossly contaminated at the time of admission and got infection afterwards. These findings are consistent with the published reports of other workers.

In the collagen sheet applied areas pain persisted for different period, in 24 out of 25 areas though all of them were 'take up' cases. Probably the irritation of exposed nerve ending by rough collagen sheet and remaining preservative i.e. ethylene oxide on the surface of collagen sheet, were responsible for it. It seems that despite the washing of collagen sheet with normal saline preservative is not washed out fully. So 3 cases complained of increased pain and burning sensation.
It was noted that amniotic membrane adhered to raw surface within 6–18 hours in all the 25 'take up' areas while all the collagen sheet applied areas adhered within 12–18 hours. Adherence has been proposed to be the most important property of biological and synthetic dressings over decellularized surfaces. It has also been shown that adherence of dressing to granulating or freshly produced wound can significantly reduce the bacterial contamination. As soon as amniotic membrane and/or collagen sheet adhered to surface patient was able to move that part. Most of the prosthesis and graft rely on the endogenous adhesive fibrin for adherence. This property of material is therefore determined by the strength of bonds that forms with fibrin. The studies have demonstrated that fibrin bonds preferably to collagen in normal skin.

Both the bio-dressing undergoes changes, as regards to their surface margins, thickness, dryness and colour. The wrinkles, though different in size and direction, develop in both the bio-dressings after 24–36 hours. The curling up of margins from the adjacent normal skin took place slightly earlier in collagen sheet (4–13 hours) than amniotic membrane (6–24 hours). The curling up from wound surface was also earlier in the case of collagen sheet (7–14 days) than that of amniotic membrane (9–14 days).
In most of the areas covered by bio-dressings, seepage was absent after their application. Out of 53 areas where bio-dressings were applied only 8 showed seepage and 5 of them were having pus. All the areas, treated with antibiotic gauze pieces, developed seepage and pus. Out of 29 amniotic membrane applied areas pus developed in 4 cases. 2 of them were having grossly contaminated in their wounds at the time of admission and later on these wound surfaces rejected the membrane. These patients died later on due to shock and sepsis. Only one area out of 26 developed pus pockets underneath collagen sheet. None of the area rejected the collagen sheet. This rejection does not denote the rejection of foreign material by the surface but the formation of pus underneath bio-dressing, is responsible for it. In all the cases where pus was found the causative organism might have been present over wound surface prior to application of the bio-dressing. It showed that collagen sheet and amniotic membrane application prevents invasion of bacteria from cut side.

Julian A Sarting (1955) used the amniotic membrane in old infected wounds. Martin (1972) in his experimental study concluded that amniotic membrane controls the bacterial population on allograft skin, however the decrease was greater than that with the skin
Exact mechanism is not known but different workers have suggested different mechanisms. Celenska and Snyder (1970) demonstrated multiple factors in human amniotic fluid which are said to be antibacterial. Chalashe et al. (1974) pointed out the uncertainty of remaining of these factor in amniotic membrane. Martin (1972) using in vitro technique reported the absence of such antibacterial factor. He proposed that in-vivo host's own defence mechanism deals with microorganism in biologically achieved alone wounds with the help of bio-dressings.

Kibence et al. (1976) noted that incidence of wound infection in collagen sheet treated patients was 30% as compared to 66.6% in autograft and 95% in antibiotic gauze piece treated wounds. This findings is not consistent with the finding of present study which showed only 8% infection in collagen sheet applied areas.

In this study the lower incidence of infection of collagen sheet treated cases than that of amniotic membrane treated cases, is not significant because 2 of the 4 infected membrane treated cases were grossly contaminated before the application. The collagen sheet is tested for sterilization before it is supplied while sterilization of amniotic membrane is not guaranteed though it is preserved in proper disinfecting solution.
In present study out of 25 'take up' amniotic membrane applied areas 22 healed within 22 days completely and 4 partially which further took 31-33 days in complete healing while out of 25 collagen sheet applied areas 24 healed within 25 days with complete healing and 2 with partial healing which further took 25-35 days in complete healing. None of the 6 antibiotics gauze piece applied areas healed before 25 days. This shows that bio-dressing application enhances the process of healing and reduce the time taken in total healing.

Usually epithelization occurred rapidly and completed in 14 days. Pigeon (1960) reported no evidence of reproduction of amniotic membrane. Bino (1965) stated that in grafted areas crust was formed which remained dry and free from infection. Then it peels off in 9-20 days. During first 5 days crust thickened gradually and changed its colour from cream yellow to brown. They also become corrugated, hard and tough. The findings of present study are in consistent with above mentioned study. Jain et al (1978) showed complete healing within 22 days in 80% of superficial burn in collagen sheet treated cases. He concluded that prevention of air burns infection after producing the close wound with the help of collagen sheets was the main factor for early healing.

To compare the time taken by 2 biological
dressings it was noted that out of 26 'take up' membranes applied areas 3 healed within 17 days, 17 within 19-20 days and 5 within 20-25 days while in 26 sheet applied areas 14 healed within 15 days, 9 within 19-20 days and 4 within 20-25 days. This showed that the healing in mero of collagen sheet applied areas was slightly earlier. This difference in time of healing is not significant because total time taken in the healing of superficial burns depends upon the number of cells preserved for re-epithelialization. So it is the wound surface which determines the time of healing when sealed as close wound by bio-dressing. The difference in healing time between amniotic membranes and collagen sheet may be due to slower peeling off of amniotic membranes from the wound surface after healing has taken place under mero than that of collagen sheet.