Section: General Surgery

Original Research Article

IS AMNIOTIC MEMBRANE A GOOD SUBSTITUE IN MANAGEMENT OF SUPERFICIAL BURNS IN PEDIATRIC PATIENTS?

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ABSTRACT

Background: The use of amniotic membrane as a biological dressing in case of superficial to deep burns is simple and cheap and can be used instead of our conventional dressing methods. The membrane prevents heat and water loss from the wound, acts as a barrier to bacterial contamination and promotes healing by promoting variety of growth factors.
Materials and Methods: In our study we have collected data of all the pediatric patients(30)admitted .
Results: we have found satisfactory results, when compared to duration of hospital stay, number of dressings, pain management and is cost effective.
Conclusion: This method is very feasible and can be adopted as a modality of treatment for burn wounds.
Keywords: Amniotic Membrane, Superficial Burns, Pediatric Patients

INTRODUCTION

Burns is regarded as a global health problem, and it accounts for about 310,000 deaths annually. Most of these burn's are seen in lower or middle income countries, with highest incidence seen in Southeast Asia.[1]

Burns in children are commonly due of domestic accidents, and are graded as the highest reason for traumatic injuries. This accounts for third most common cause of death among children in developing countries. Burns in children require a team effort for adequate care which gives initial treatment with accompanying shock and as the incidence is high, proper treatment for the child is essential.

As the immunity of the child reduces, the infection becomes one of the major issue to hamper the healing process in burns wound. The rate of loss is proportional to the surface area exposed and the depth of burns. So, to prevent this loss the burn wound should be covered immediately.[2]

The biological material contains innumerable cytokines, growth factors, and stem cells. Amniotic membrane is also used recently in, burns, nerve regeneration, soft tissue reconstructive surgeries, ocular surgeries, and diabetic foot ulcers.[3]

Human amniotic membrane is widely used in case of superficial and deep burns but the success rates are different in both the cases. It is easily available, can be prepared as large size as possible, and application is also easy and cost effective. It is non-reactive and reduces 15% of water loss.

Amniotic membrane can be used in two ways

1. In Toto (amnion and chorionic)- for deep burns
2. Amniotic membrane- for superficial burns

The amnion is the innermost layer of the placenta, it is a semitransparent membrane. Fresh amnion carries contamination and may cause diseases transmission. So, before collecting the placenta it has to be screened. The placenta can be preserved in different ways like, cryopreservative liquid nitrogen, silver nitrate, in antibiotic solution.[4]

Amniotic membrane

The amnion forms during the second week of embryonic development, soon after blastocyst implantation. The amniotic membrane lines the innermost layer of the placenta, consisting of both amnion and chorion. It is composed of multiple layers, with various mesenchymal cells, and an epithelial layer closest to the embryo.

Amniotic membrane has several unique properties that contribute to the tissue's ability to promote healing and reepithelialization. Studies have demonstrated that amnion and amniotic membrane products contain growth factors such as platelet derived growth factor AA (PDGF-AA), PDGF-B, epidermal growth factor (EGF), placental growth factor (PLGF), transforming growth factor **α** (TGF-**α**), TGFB1, basic fibroblast growth factor (bFGF), and granulocyte colony stimulating factor (GCSF), all of which are implicated in healing and regeneration.

Amniotic membrane has also been shown to up-regulate the synthesis of growth factors in culture. Some of the growth factors that amniotic tissue contains also promote angiogenesis, a process that has been demonstrated with the implantation of amniotic tissue into the subcutaneous tissue of mice.

In addition to providing important growth factors, amnion has been shown to recruit stem cells to sites of healing and increase stem cell proliferation. Amniotic tissue also contains anti-inflammatory cytokines such as IL-4, IL-6, IL-8, IL-10 and tissue inhibitor of metalloproteinase (TMP) 1, 2 and 4. The tissue and its derivative products contain lysozymes and immunoglobulins that also make it antibacterial. A major benefit to amniotic products, especially when compared with other skin substitutes, is that they are generally nonimmunogenic. Amniotic epithelial cells have been found to lack HLA-A,B, C, or DR antigens and beta-2 microglobulin and have also been shown to decrease cytokine synthesis and the inflammatory response in vitro.

Amniotic membrane has shown to increase healing rates, decrease rate of infection, shorten hospital stay, decrease the number of dressing changes required in burns patient and reduces the cost.[3]

MATERIALS AND METHODS

The study was a conducted in department of general surgery BLDE Univerity, from the time period of January 2017 to August 2018.

In this study we had included all the paediatric cases admitted in the burns unit, and the placenta were taken from dept of obstretrics and gynaecology in fresh form. Both vaginal and caesarean section placenta were taken after confirming the patient is negative for TORCH infection, hepatitis B, hepatitis C, AIDS, and syphilis before childbirth was not included. For hepatitis B and C, AIDS and syphilis infections, serological tests of HIVAb, HBS Ag, HCVAb and VDRL were carried out.

Under all asceptic precautions, in first tray the placenta was washed with normal saline thoroughly, and the amniotic membrane i.e. the semitransparent membrane is slowly seprated from the placenta, taking care that the membrane is removed in toto. And while seprating once you reach the umbilical cord from periphery the membrane is cut.The membrane is washed in normal saline solution, such that all the clots and the debris should wash away.

In the second tray gentamicin solution is prepared and the amniotic membrane is carefully transferred to the bowl, and placed their for 6 hours. The burns area is cleaned with normal saline and the amniotic membrane is carefully placed over the area, and dressing with plane pads is done.

The dressing is removed after 24-48hrs and while removing the dressing the pain score is calculated. In patients with amniotic membrane dressing the dressing was done only once. Once the wound heals the patient s were discharged and were followed up in the OPD.Figure1-4 shows the preparation of amniotic membrane.

In case of control group the dressing was done with silver sulphadiazine, cuticle, debrin etc. And it was done on alternate day. And the pain score was calculated accordingly.

Figure-1

Figure-2

Figure-3

Figure-4

Figure-5- Resut of silver sulphadiazine dressing

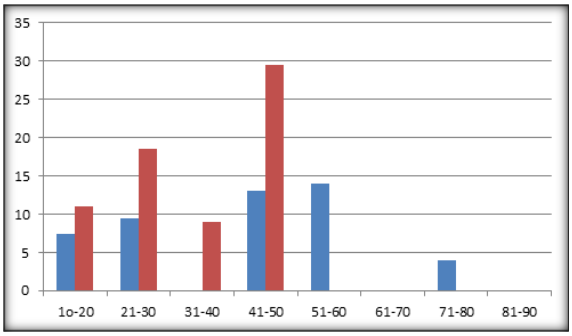
Figure 6- Result of amniotic membrane dressing.

Figure 7- other patient of amniotic membrane dressing.

RESULTS

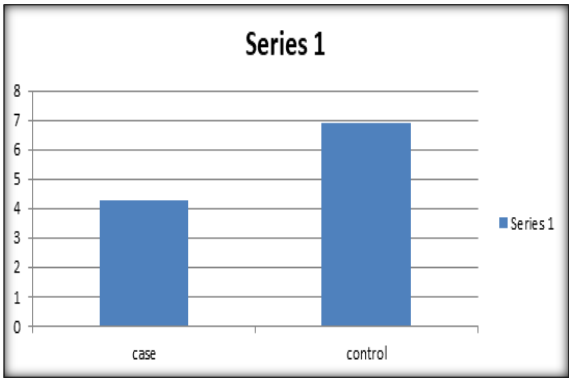
Total number of patient in this study were 30 cases.
The duration of hospital stay was calculated in both the cases which showed the average hospital stay of amniotic membrane dressing were 7.9% and that of control were 15.05%.
Depending on the percentage of burn s the mean hospital stay was calculated which showed the hospital stay in control group was more when

compared to amniotic membrane dressing. [Bar Chart 1]



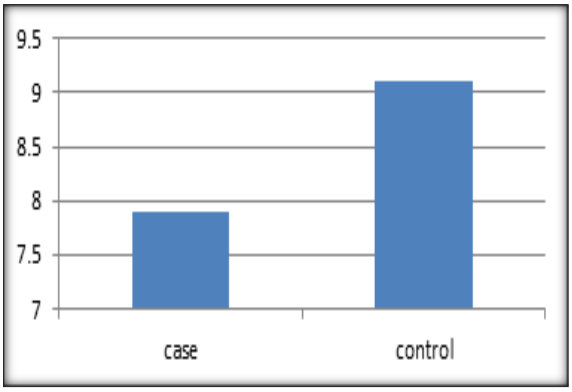
Bar Chart 1: Perecentage of burns.

This bar graph shows the mean distribution of age in both the groups. [Bar Chart -2]



Bar Chart 2: Mean distribution of age

Pain scoring was done which showed that the pain post amniotic membrane dressing is less when compared to control group.



Bar chart 3: Number of dressing in both group

This graph shows the number of dressing s in both groups.(Bar Chart-3)

Table 1: It shows the sex ratio of the patients admitted, which is almost equal

SEX	MALE	FEMALE
CASE	5	6
CONTROL	10	9

DISCUSSION

The use of amniotic membrane as biological dressing in the treatment of extensive burn wounds has been described in order to early recovery of patient, improvement of wound healing and its quality. Studies demonstrated that use of amnion in burn wounds can lead to reduction of pain intensity and prevent water and electrolyte disturbances and also can help for early preparation of the wound bed for grafting.[3]

Amnion prevents the wound from irritation, evaporation, dryness and also nerve ending stimuli on the wound surface. These characters could not be seen in routine dressings. In the first 24-48 hours after any skin abrasion, skin harvesting or even primary repair in surgical wounds, basal epithelial cells can cause a water tight closure in wound layer together with migration and mitosis processes. The antibacterial effect of amniotic membrane is probably due to the lysozymes is bactericidal and progesterone is bacteriostatic. The adherence of any biological dressing is of immense therapeutic importance and is described as 'fibrin-elastin biological bond'.[2]

As described by our study the method of prepration of amniotic membrane is also simple, feasible, cost effective. As our study shows the duration of hospital stay was less than the control group, a study conducted by Mostaque et al., also found significant reduction in the hospital stay($p<0.05$).[5]

As shown in table-5 the number of times the dressing is changed is also less when compared to control group. In a study conducted by Adly et al., which showed significant decreased frequency of dressing changes($p=0.000$).[6]

Multiple studies have suggested significant improvements in quality of life with the use of amniotic membrane, including increased compliance and more rapid discharge. Eskandarlou et al. focused on patient's pain scores for donor graft sites treated with amniotic membrane dressings. Amniotic membrane patients had significantly less pain during the first three days following burn surgery compared with standard wound dressing. Therefore, a decreased necessity for dressing changes can contribute to the patient's improved quality of mental health and potentially improve the

patient's mobility, motivation, and overall outcome.[7]

CONCLUSION

Amniotic membrane immediately epithelializes the burn wound by accelerating the migration of fibroblasts and development of collagen during the first 6-8 days of repair process, and there are no reactions or rejections of the membrane.

Amnion does not 'take', it only acts as a biological dressing. Application of amniotic membrane reduces discomfort, pain during dressing, period of hospital stay, accelerates wound healing and is cost effective. It is also readily available. Hence it is should be used in management of burn wounds.

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