

A study of the role of amnion as a biological dressing on healing of wound due to burns and non-healing wound

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Abstract

Introduction: The prevention or at least control of burn wound sepsis is absolutely vital, if mortality rate in the major thermal burns is to be lowered to an acceptable level. Meticulous surgical care of the burn wound and intelligent programs of topical therapy have achieved good result in recent years." Stone H.H. **Aims and Objectives:** To Study the Role of Amnion as a Biological Dressing on Healing of Wound Due To Burns and Non-Healing Wound. **Methodology:** Patients of burn wounds and non-healing wounds admitted in Govt. medical college hospital, Aurangabad, over a period of Jan. 1990 to Jan, 1992 are included in this study. Out of 50 cases studied, 40 cases are of burn and 10 case of non-healing wounds. Placentas from clean vaginal deliveries, emergency and elective caesarian section of sero-negative (non-syphilitic) mothers were collected in sterile bowls. After application of the dressing were amnion, relief of symptoms were asked such as relief of pain, discomfort, improvement in joint movement and sense of well-being. **Result:** Pain relief, Reduction in discharge, Reduction in size occurred in all 50 cases. The application was done twice and in thirteen cases, three amnion applications were done: all these eighteen cases showed complete healing. In ten superficial wounds, fourth application was needed. Out of these ten cases eight wounds healed completely but in remaining two patients skin grafting was required. There were 20 cases of deep wounds. Out of which none showed any response with single application. Two cases (4%) healed totally following two application of amnion. For the rest eighteen cases, further applications were needed to obtain some conclusive results. With three applications, healthy granulation tissue appeared in two cases (4%). For remaining sixteen (32%) cases. (4%) healed completely and in 14 cases (28%) From the above table, it is seen that 28 superficial wounds healed completely while only in 2 cases the raw area was converted into healthy Granulation. **Conclusion:** There was prompt clinical response in the form of relief of pain ulcer healing and formation of granulation tissue seen by the application of amnion. **Key Words:** Amnion, Burns, Non-Healing Wound.

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INTRODUCTION

"The prevention or at least control of burn wound sepsis is absolutely vital, if mortality rate in the major thermal burns is to be lowered to an acceptable level. Meticulous

surgical care of the burn wound and intelligent programs of topical therapy have achieved good result in recent years." Stone H.H.(1973)

There are many problems to be solved in the management of burns of lowering the mortality rate. The main problems are-The exact patho-physiology of burns. The role of toxemia. The problem of skin covers in extensive burn. The control of infection of the burn wound. In a burned patient, the large raw area is like a culture plate, in which the organisms can multiply. Some degree of bacterial contamination is inevitable. The importance of bacterial contamination is inevitable. The importance of bacterial contamination was shown by Aldrich (1933), Dunbar (1974) and Cruickshank (1935). Aldrich claimed that so called "toxemia" of burns was the result of infection. By 1960 strepto and staphylococci organisms

were controlled by adequate antibacterial agents. However a further altered ecology resulted in the emergence of pseudomonas, the first “Amphibiont”. Till today, various substitutes are tried as temporary dressings. Initially cadaveric skin was used (Girdner 1881). At the same time, skin from fresh amputation stump was used (schyte 1881). Simultaneously the search for human skin substitute continued. The desirable properties of such a substitute include, an effective vapour bacteriostatic activity, durability, elasticity, adherence and protection from pain. Heterograft has shown promise because of its availability and because of many of these qualities. Porcine heterograft skin is being tested for treatment of big wounds (shuck 1970). The “ideal” skin substitute is yet to be available but “amnion” fulfills most of the membrane as a biological dressing for the wounds is simple and cheap and has been found to be superior to allograft sans xenografts. Moreover, it is very easily available. The membrane prevents protein and water loss from the wound surface and acts as a barrier against bacterial contamination. Due to adherence property and because of antibacterial activity it helps in sterilization of wound, thereby aiding the healing process and reducing morbidity. Another significant and important property of the membrane is its ability to offer marked relief from pain(Bose 1979). The rationale behind the use of biological dressing according to shuck and moncrief (1969) is –To prevent wound desiccation due to evaporating water loss, to protect from bacterial invasion, to prepare & preserve the wound for future grafting. A particular advantage of biological dressing is the biological dressings have been helpful in the management of severe electrical injuries and even can be used to dress the operative wound. The present study undertaken to study the role of amnion as a biological dressing on healing of wound due to burns and non-healing wound.

MATERIAL AND METHODS

Patients of burn wounds and non healing wounds admitted in Govt. medical college hospital. Aurangabad, over a period of jan.1990 to Jan,1992 are included in this study. Out of 50 cases studied, 40 cases are of burn and 10 case of non healing wounds. Placentas from clean vaginal deliveries, emergency and elective caesarian section of sero negative (non-syphilitic) mothers were collected in sterile bowls. Placentas from mother with the following conditions were rejected , Premature rupture of membrane, Toxemia of pregnancy, History of endometritis and p.i.d., History of venereal disease , Meconium stained or abnormal appearing liquors both in vaginal and caesarian section deliveries, the total number of applications were noted as I,II,III,IV likewise. In cases where the wounds were badly infected. Amnion dressings

were done or more times. The number of application required for complete healing or conversion into healthy granulation were recorded. After application of the dressing were amnion, relief of symptoms were asked such as relief of pain, discomfort, improvement in joint movement and sense of well-being. Effect of amnion dressing over raw area was noted in the form of complete healing or appearance of healthy granulation tissue. In the cases where complete healing did not occur, definitive treatment in the form of skin grafting was done.

RESULT

Table 1: Showing clinical response of amnion application

Sr. No	Effect of Amnion Application	No. of cases
1.	Pain relief	50
2.	Reduction in discharge	50
3.	Reduction in size	50

Pain relief, Reduction in discharge, Reduction in size occurred in all 50 cases.

Table 2-A: Showing the effect of amnion application over superficial wounds

Amnion application	No..of cases of superficial wounds	Observation	
		Healed completely	Appearance of Healthy granulation
I	2(4%)	2(4%)	--
II	5(10%)	5(10%)	--
III	13(20%)	13(26%)	--
IV	10(20%)	8(16%)	2(4%)
Total	30(60%)	28(56%)	2(4%)

So, it is seen from above Table that that, after first application two cases of superficial wounds showed complete healing. In five cases. The application was done twice and in thirteen cases, three amnion applications were done: all these eighteen cases showed complete healing. In ten superficial wounds ,fourth application was needed. Out of these ten cases eight wounds healed completely but in remaining two patients skin grafting was required.

Table 3-B: Showing the effect of amnion application over raw deep wounds

Amnion application	No. of cases of deep wounds	Observation	
		Healed completely	Appearance of Healthy granulation
I	--	--	--
II	2(4%)	2(4%)	--
III	2(4%)	--	2(4%)
IV	16(32%)	2(4%)	14(28%)
Total	20(40%)	4(8%)	16(32%)

Thers were 20 cases of deep wounds. Out of which none showed any response with single application. Two cases (4%) healed totally following two application of amnion.

For the rest eighteen cases, further applications were needed to obtain some conclusive results. With three application, healthy granulation tissue appeared in two cases (4%). For remaining sixteen (32%) cases. (4%) healed completely and in 14 cases (28%) healthy granulation tissue was observed.

Table 4: Showing the effect of amnion application over raw areas

Nature of wound	Complete Healing	Formation of healthy granulation	Total
Superficial	28	2	30
Deep	4	16	20
Total	32	18	50

From the above table, it is seen that 28 superficial wounds healed completely while only in 2 cases the raw area was converted into healthy Granulation. In cases of deep wounds, four cases showed complete healing while sixteen raw areas were converted to healthy granulation tissue.

Table 5: Showing the number of cases in which the skin grafting required following amnion dressing

Nature of wound	Total number of cases	Number of cases required skin grafting
Superficial	30	2(4%)
Deep	20	13(26%)
Total	50	15(30%)

From the above table in is seen that out of thirty superficial wounds, only 2 cases required skin grafting. While out of 20 cases of deep wounds, skin grafting was done in thirteen cases, in one patient with deep wound. The ulcer size was reduced to less than 25% and here no grafting was necessary. While two patients with deep wound in whom skin grafting were advised, went against medical advice.

DISCUSSION

Amniotic membrane is unique in its anti-adhesive effect, bacteriostatic property, wound protection, pain reduction and epithelialization. Membrane becomes cohesive, on the wound and peels off on epithelialization on its own without any external intervention. This has been demonstrated by many studies using amnion for dressing in diverse clinical conditions.^{1, 2, 3}

Histologically this membrane has amnion and chorion which are loosely held with each other. The inner amnion has cuboidal or flattened epithelial cells and outer chorion has extra-embryonic mesenchymal connective tissue. Since it is formed from fetal ectoderm, Pigeon has stated that, this membrane is continuation of fetal skin.³ Ultra structural details of amniotic membrane and fetal skin show similarities.⁴ Hence amniotic membrane can be considered as fetal skin allograft.⁵ This may account for beneficial effects of this membrane in wound dressing.

Chronic skin ulcers, including diabetic ulcers, venous ulcers and pressure ulcers remain a great challenge in the clinic. This has led surgeons to look out for biological materials in treating chronic ulcers. Many researchers have used amniotic membrane dressings in the past in treatment of these ulcers. Amniotic membrane, used as skin graft offers many features of ideal wound coverage like protect wound from secondary infection, provide and maintain a moist environment, prevent loss of fluids, promote healing, be elastic and non-antigenic, adhere well to wound¹. It's an immunologically inert graft as it do not express HLA-A, B, C and DR or $\beta 2$ micro globulin⁷. In addition the membrane produces various growth factors including basic fibroblast growth factor, transforming growth factors, angiogenic factors, all contributing to faster granulation and better reepithelialisation^{2, 6}.

Antimicrobial property: This property is believed to be due to the presence of antibodies in the AM and the impervious nature of the AM to micro-organisms⁹. The high thrombin activity of the AM allows a very rapid and efficient attachment of the AM to the granulating surface¹⁰. This close adherence eliminates the exposed status of the wound, which checks the bacterial count and allows restoration of the lymphatic integrity, which protects the circulating phagocytes from exposure and allows the removal of the surface debris and the bacteria⁹. The AM stimulates epithelialization from the ulcer bed and/or the wound edge, which is considered to be mediated by growth factors and progenitor cells which are released by it. One of the most striking effects, as was noted by Faulk et al and Burgos, is its granulation stimulating effect. This is due to some angiogenic and growth factors which are produced by the membrane¹⁰. Despite being a human derivative, it is not rejected, because the AM does not express the HLA A,B,C and the DR antigens, as was stated by Ward and Bennet in their study. Pain Relief: This is one of the well -recognized properties of the AM when it is used as a skin substitute¹². This is possibly due to the diminished inflammation, the better state of hydration of the wound bed¹³ and protection of the exposed nerve endings from external irritants. • Its other important properties are its anti-adhesive property it peels off on its own once the surface is epithelialized) and its scar reducing property¹⁴. Various techniques and methods have been described for its preservation. We followed the glycerol preservation method, because of the ease of preservation and reconstitution, low cost and because of the anti bacterial and antiviral properties of glycerol. A glycerol preserved amnion is as effective as a fresh amnion¹⁵. Another Indian study which used 85% glycerol for amnion preservation showed excellent results which were

obtained with the use of this extremely economical dressing. This emphasizes the importance of establishing “amniotic banks” in all hospitals, especially in the developing countries¹⁵.

As amnion is a biological dressing, repeated number of application were required to achieve the desired response over the raw area either in the form of complete healing or conversion into healthy granulation tissue. So, it is seen that, after first application two cases of superficial wounds showed complete healing. In five cases. The application was done twice and in thirteen cases, three amnion applications were done: all these eighteen cases showed complete healing. In ten superficial wounds, fourth application was needed. Out of these ten cases eight wounds healed completely but in remaining two patients skin grafting was required, out of which one patient was anaemic (Hb-78.6 grams%) and the other was having raw over operated breast.

There were 20 cases of deep wounds. Out of which none showed any response with single application. Two cases (4%) healed totally following two application of amnion. For the rest eighteen cases, further applications were needed to obtain some conclusive results. With three application, healthy granulation tissue appeared in two cases (4%). For remaining sixteen (32%) cases. (4%) healed completely and in 14 cases (28%) healthy granulation tissue was observed.

So, out of total cases of deep wounds, 4 cases healed completely and in sixteen cases there was evidence of healthy granulation tissue.

, it is seen that 28 superficial wounds healed completely while only in 2 cases the raw area was converted into healthy Granulation. In cases of deep wounds, four cases showed complete healing while sixteen raw areas were converted to healthy granulation tissue. is seen that out of thirty superficial wounds, only 2 cases required skin grafting. While out of 20 cases of deep wounds, skin grafting was done in thirteen cases, in one patient with deep wound. The ulcer size was reduced to less than 25% and here no grafting was necessary. While two patients with deep wound in whom skin grafting was advised, went against medical advice. In the presents study In all the 50 cases, clinical response of the patient were noted by parameters like pain relief, of reduction in discharge and reduction in the size of the ulcer, pain relief was seen in all 50 patients. There was reduction in discharge in all the cases. Bose (1980)⁸ has stated that, in his study of 15

cases of burn with the amnion application, pain relief was impressive and in tow of the cases it was dramatic.

CONCLUSION

There was prompt clinical response in the form of relief of pain ulcer healing and formation of granulation tissue seen by the application of amnion.

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