Indian Journal of Plastic Surgery (1987), 20(1), pp. 8-12

AMNIOTIC MEMBRANE PROCURED FROM CAESAREAN SECTION FOR COVERAGE OF BURN WOUNDS

J. L. Srivastava, V. K. Tewari, R. P. Narayan and Dur-E-Shawar

Amniotic membrane from human placenta was being used as a biological dressing for burn wounds in the Department of Burns, Plastic and Maxillofacial Surgery, Safdarjang Hospital, New Delhi, for the last 8 years. Previously we were using this membrane as a biological dressing procured from normal vaginal delivery, after thoroughly washing it and disinfecting it with sodium hypochlorite. Prior to application in burn wounds, a routine culture and sensitivity was being obtained. Our results with amniotic membrane procured as mentioned above were not satisfactory. Few burn cases became more infected and deteriorated quite a bit, forcing us to remove the membrane immediately. Since the last 2 years we have switched over to the placental membrane procured under full aseptic technique from patients undergoing Caesarean section. On an average 4-5 Caesarean sections and 30-40 vaginal deliveries are being performed per day in the Department of Obst. and Gynaecology, Safdarjang Hospital, New Delhi, where about five thousand patients of burns are treated in a year.

Table 1. Age and Sex Distribution of the patients in whom Amnion was used.

Age (years.)	Sex	Amnion in Superficial burns (No. of patients)	Amnion Applied over the raw area. (No. of patients)
0-10	Male	14	6
	Female	12	2
11-20	Male	10	8
	Female	14	9
21-30	Male	11	4
	Female	15	11
31-40	Male	12	10
	Female	13	11
41-50	Male	8	6
	Female	6	7
51–60	Male	4	2
	Female	3	1
60-and above.	Male	2	1
	Female	3	0
Total		127	78

Material and Methods

We have randomly selected burn patients belonging to different age groups with percentage of burns ranging from 10% to 35%. Total number of patients studied were 205 from January, 1985 to December, 1986 (Table 1).

Collection of Amniotic membrane during Caesarean section and its storage

One research associate was specifically posted in Department of Obst. and Gynaecology to find out the number of elective or emergency Caesarean sections. He was responsible for collecting the placenta of sero-negative mothers undergoing Caesarean section, under full aseptic precautions. Amniotic membrane was isolated according to the method of Dino et al. (1966), except that we did not use any chemical solution for sterilization. Membranes were aseptically taken out from placenta and amnion was separated from chorion. After that, it was thoroughly washed in saline and any blood clots were removed with forceps or sterile gauze pieces. A small piece of membrane was sent routinely for bacterial culture, Amniotic membrane so procured was stored at 4°C in sterile jars

and used within 72 hours.

In superficial burns it had been our practice to take the patient to the burns operation theatre directly and after removing the dead skin under sedation, amniotic membrane with its amniotic surface in contact with raw area, was spread all over to cover the raw area completely. Patients were observed in O.T. for next 30 minutes, to ensure that the membrane is sufficiently adherent and the outer surface has completely dried up. They were then transferred to the ward and nursed accordingly (Fig 1 and 2).

In deep burns after separation of eschar and cleaning, the raw areas were covered with amnion. Five to six days later, these patients

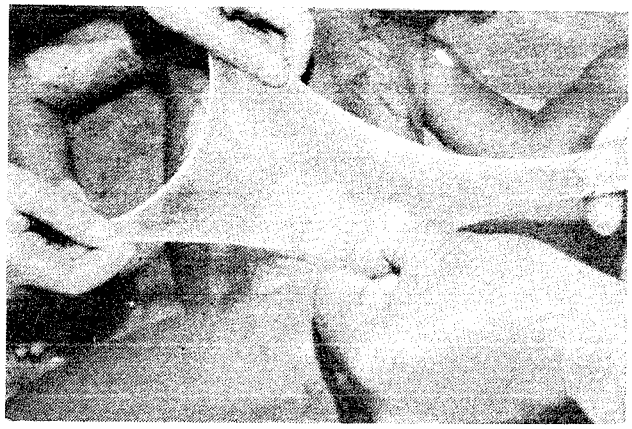

Fig. 1. Fresh amnion procured from caesarean section ready for application on burn surface.

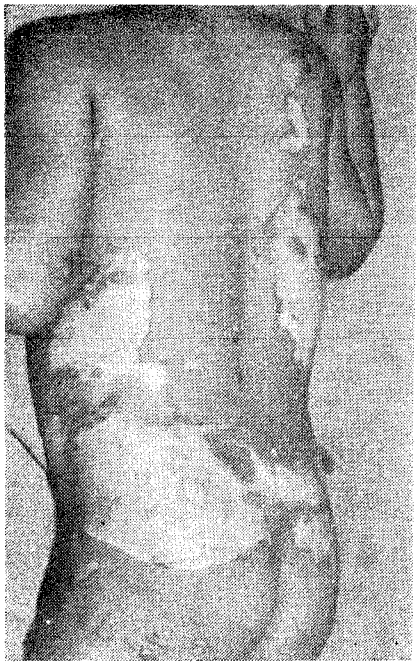

Fig. 2. Amnion applied over fresh superficial burns.

Fig. 3. One week after amnion application, superficial burns almost healed.

were prepared for skin grafting when amnion was removed and skin grafts were applied after adequate haemostasis.

Observation and Discussion

The age and sex distribution of patients studied is given in (Table 1). Below 10 years males were predominant while above that females were affected more; a usual trend in tropical countries.

A. Amniotic membrane in superficial fresh burns

Causes of burns were different in different age groups. In children it was mainly scalds from hot liquids (90%), whereas adult burns were mainly caused by flames (65%). Body surface areas ranged between 8% to 35%. Areas were kept exposed after the application of the membrane. Ten percent patients required reapplication due to displacement of the membrane especially in irritable children and in another 5% underlying collection necessitated change of the membrane. The results were compared with patients of superficial burns (control group) dressed with topical antibacterial cream (Silver Sulphadiazine) in following respects:—

Table 2. Bacterial Contamination of Amniotic Membrane

Type of Bacteria cultured from Amnion prior to application	Amnion from Vaginal delivery	Amnion from Caesarean Section
E. Coli	8	—
Proteus	9	—
Pseudomonas	13	—
Klebsella	6	—
Staph. Aureus	—	—
Streptococcus	—	—
Culture sterile	14	50
Total	50	50

(1) Cost of treatment.
(2) Pain and other discomforts to the patients.
(3) Wound infection.
(4) Total healing time.

1. *Cost of treatment*

The average cost of local treatment in patients treated with amniotic membrane was negligible as amniotic membrane was available to us in plenty, free of cost. Moreover, dressing had to be done only once in most of the cases saving lot of time for an already under staffed unit.

Average cost of one dressing by Silver Sulphadiazine cream was Rs. 150/-. Patients with superficial burns required on an average 4 changes of dressing before the healing was complete, making it roughly Rs. 600/- per patient, apart from the time and effort involved in those dressings.

2. *Pain and other discomforts*

Burnt children usually go to sleep after application of amniotic membrane as pain is substantially reduced. The only problem with infants and small children was that they unknowingly scratched the burn wound. To prevent this, their hands were kept in boxer's position. Adult patients in whom amniotic membrane was applied required infrequent sedation as compared to patients in whom closed dressing was done. The major discomfort and pain to the patient at the time of frequent change of dressing as well as the risk of damage to growing epithelium was also minimised.

3. *Wound infection*

All superficial burns where amnion was applied healed completely without any infection. Since the membrane used is transparent, daily inspection can be done. In 5% of cases as stated above there was underlying patchy collection. Macerated amnion from those areas was removed

and fresh amnion re-applied, after thoroughly cleaning the areas. All burns healed primarily without any infection and none of them turned deep.

Two percent of known superficial burns treated with Silver Sulphadiazine topical cream got infected and became deep and required skin grafting.

4. *Total healing time of burn wounds*

Healing time was between 10 to 15 days in all superficial burns treated by any method provided that there was no infection. In those patients in whom amnion was applied, as wounds started healing the amniotic membrane gradually got separated in the form of a dry scale (Fig. 3).

Table 3. Number of patients in relation to body surface burn in whom amnion was used

Body surface burn (percentage)	Superficial burn (No. of cases)	Deep burn raw areas (Amnion applied prior to skin grafting) (No. of cases)
5-10	19	33
11-15	43	24
16-20	27	12
21-25	14	6
26-30	18	3
31-35	6	0
Total	127	78

B. Amnion on burn raw areas

Amnion was routinely applied over the post burn raw areas one week prior to skin grafting (Table 3). It got adhered with the raw surface like a biological dressing. In few cases of extensive raw areas i.e. more than 20%, where patients were in severe catabolism, protein and fluid loss through open burn surface was reduced considerably and thereby rapid anabolism was achieved.

In 80% patients with healthy granulation tissue, amniotic membrane got stuck to the raw areas, whereas in the rest, it got macerated by 3rd to 4th day. The macerated membrane was completely removed and replaced by a fresh membrane. Wound swab for bacterial culture was sent in all the cases before application of the membrane over the wound. Wound swab showed a variety of bacterial flora and in none of the cases the burnt raw area was sterile.

Wound swab for bacterial culture was also sent before doing definitive autografting after removal of the amniotic membrane. Culture was sterile in 70% of cases. These areas behaved as freshly prepared surgical wounds and graft take was 95% to 100%.

In raw areas with healthy granulation tissue, graft acceptance rate on an average was 75% but if 5 days prior to autografting sterile foetal membrane was applied over them, take of autograft improved markedly. Total stay in hospital, number of post-operative dressings and incidence of re-grafting due to poor take at recipient site were also minimized (Table 4).

Table 4. Comparative study between patients having raw areas requiring skin graft with and without pre-treatment with foetal membrane

	Raw areas on which auto-grafting was done directly	Raw areas on which auto-grafting was done after pre-treatment with foetal membrane
No. of patients	106	78
Average % body surface raw area	12	18
Average graft take (%)	78	94
Re-grafting needed (%)	22	0
Average post-operative days for which hospitalization required	26	14

REFERENCES

1. Dino, B. R., Eufemio, G. G. and Devilal, M. S. : Human Amnion : The Establishment of an Amnion bank and its practical applications in Surgery, J. Phillippine Med. Association 1966 ; 42 : 357.
2. Klen, R. : Preparation of chorion and/or amnion grafts used in burns for research in burns. H. Huber Verlag, Berne, Stuttgart, Vienna, 1971 ; p. 289.
3. Kucon, J. O., Robson, M. C. and Parson, R. W. : Amniotic membrane as dressing following dermabrasion, Ann. of Plast. Surg. 1982 ; 8 : 523-525.
4. Peters, W. J. : Biological dressing in burns—A Review. Ann. of Plast. Surg. 1980 ; 4 : 133-7.
5. Pigeon, N. J. : Treatment of second degree burns with amniotic membranes. Canad. Med. Ass. J. 1960 ; 83 : 844.
6. Wolf, D. A., Capozzi and W. R. Pennis : Evaluation of biological dressings Ann. of Plast. Surg. 1980 ; 5 : 180-4.

The Authors

Dr. J. L. Srivastava, M.S., M.Ch., *Consultant in Plastic Surgery* and *Head of the Deptt. of Burns*, Plastic and Maxillofacial Surgery, Safdarjang Hospital, New Delhi-29.

Dr. V. K. Tewari, M.S., M.Ch., *Plastic Surgeon*, Deptt. of Burns, Plastic and Maxillofacial Surgery, Safdarjang Hospital, New Delhi-29.

Dr. R. P. Narayan, M.S., M.Ch., *Plastic Surgeon*, Deptt. of Burns, Plastic and Maxillofacial Surgery, Safdarjang Hospital, New Delhi-29.

Dr. Dur-E-Shawar, *Clinical Asstt.*, Deptt. of Burns, Plastic and Maxillofacial Surgery, Safdarjang Hospital, New Delhi-29.

Request for Reprints

Dr. J. L. Srivastava, M.S., M.Ch., Head of the Deptt. of Plastic Surgery, Safdarjang Hospital, New Delhi-29.