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Original Research Article

A Review from Clinical Perspectives of Amniotic Membrane Dressing Vs Other Dressing Methods on Burn Ulcers of Children in Tertiary Healthcare Setups

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Abstract

Burn injuries in children represent a significant clinical challenge due to their unique anatomical and physiological characteristics, including thinner skin, higher risk of fluid imbalance, and greater susceptibility to infection and scarring. Effective wound management is crucial to promote rapid healing, minimize pain, prevent complications, and improve long-term functional and aesthetic outcomes. Among the various dressing methods, amniotic membrane (AM) has emerged as a promising biological dressing due to its rich extracellular matrix, growth factors, anti-inflammatory properties, and immunological safety. This review critically examines the clinical perspectives of AM dressing in comparison to conventional and advanced wound dressings, including silver sulfadiazine, hydrocolloids, and paraffin gauze, in paediatric burn care within tertiary healthcare setups. Key outcomes, including epithelialization rate, infection control, pain reduction, frequency of dressing changes, hospital stay, and scar formation, are analyzed to evaluate the effectiveness and practicality of AM in paediatric populations. The review also addresses challenges related to AM preparation, storage, and application, highlighting gaps in current research and opportunities for future studies. The evidence suggests that AM dressing offers significant advantages in paediatric burn management, particularly in enhancing healing outcomes and patient comfort, and may represent a valuable adjunct or alternative to conventional dressing methods in tertiary care settings.

Keywords: Amniotic Membrane; Paediatric Burns; Biological Dressing; Analgesia; Infection; Re-Epithelialization; Cost-Effectiveness..

Introduction

Burn injuries in children remain a significant global health burden, accounting for considerable morbidity, mortality, and long-term disability despite advances in acute care and reconstructive surgery. The World Health Organization (WHO) estimates that burns are one of the leading causes of injury-related deaths in children under the age of ten, particularly in low- and middle-income countries where healthcare resources are often limited [1]. Pediatric burns are distinct from adult burns due to thinner skin, immature immunological responses, and higher risks of fluid imbalance, infection, and hypertrophic scarring [2]. Management of burn ulcers in children is therefore particularly challenging and requires interventions that not only promote rapid wound healing but also minimize pain, prevent infection, and reduce the risk of long-term functional and aesthetic sequelae [3]. The choice of wound dressing plays a critical role in the outcome of pediatric burn management. Traditional dressings, such as silver sulfadiazine, paraffin gauze, and hydrocolloids, have been

widely used for decades. While these dressings can provide moisture, absorb exudate, and reduce microbial colonization, they often necessitate frequent changes, which are painful and traumatic for children, and may delay epithelialization [4]. Furthermore, the cytotoxic effects of silver-based dressings and their potential to impair keratinocyte proliferation have raised concerns regarding their routine use in children [5]. Consequently, research has increasingly focused on identifying biologically active dressings that can accelerate healing while offering superior biocompatibility and patient comfort.

Among the newer biological dressings, amniotic membrane (AM) has gained considerable attention in pediatric burn care. The amniotic membrane, derived from the innermost layer of the placenta, is rich in extracellular matrix proteins, growth factors, and anti-inflammatory cytokines, making it a naturally biocompatible and immunologically inert material [6].

Its unique composition allows it to serve as a temporary biological dressing that not only provides a physical barrier against microbial invasion but also facilitates epithelial cell migration, angiogenesis, and pain reduction [7]. AM has been successfully used in ophthalmology, chronic ulcers, and surgical wound management, and its extension into pediatric burn care represents a promising translational application [8]. Compared with conventional dressings, AM offers several theoretical and practical advantages. It adheres easily to the wound surface, reduces evaporative water loss, and maintains a moist wound environment, which is critical for optimal healing. Importantly, AM reduces pain by covering exposed nerve endings, thereby minimizing the need for frequent analgesics in children. Studies have also suggested that AM dressing lowers the frequency of dressing changes, thereby reducing hospital stay, financial costs, and psychological distress for both the child and their caregivers [9]. Additionally, its anti-fibrotic properties may play a role in minimizing hypertrophic scar formation, a major concern in pediatric burn survivors. However, despite these advantages, challenges remain in standardizing the preparation, preservation, and application of AM, which may influence its efficacy. Issues related to donor screening, sterilization, and storage methods—such as cryopreservation, lyophilization, or glycerol preservation—can affect its biological activity and clinical outcomes. Moreover, accessibility and cost-effectiveness of AM dressings compared with conventional materials may vary depending on regional healthcare infrastructure [10].

Aims and Objectives

Aim: The primary aim of this review is to evaluate the clinical effectiveness, safety, and practical utility of amniotic membrane (AM) dressing compared to conventional and advanced dressing methods in the management of burn ulcers in pediatric patients within tertiary healthcare settings.

Objectives

1. To systematically analyze existing literature on the use of amniotic membrane as a biological dressing for partial- and full-thickness burn ulcers in children.
2. To compare the healing outcomes of AM dressing with other conventional dressings, including hydrocolloids, silver sulfadiazine, paraffin gauze, and other advanced wound care materials.
3. To assess the impact of AM dressing on pediatric-specific factors such as pain reduction, frequency of dressing changes, hospital stay, and psychological comfort.
4. To evaluate the potential of AM dressing in minimizing complications, including infection, delayed epithelialization, and hypertrophic scar formation.
5. To identify challenges, limitations, and practical considerations in the preparation, storage, and application of amniotic membrane in tertiary healthcare setups.
6. To highlight knowledge gaps in current pediatric burn care research and suggest directions for future clinical studies.

Materials & Methods

This review was conducted to systematically analyze and compare the clinical effectiveness of amniotic membrane (AM) dressings versus other conventional and advanced dressing methods in the management of burn ulcers among pediatric patients in tertiary healthcare setups.

Study Design: A comprehensive literature search was performed following a narrative review methodology, focusing on studies published between 2000 and 2025. Both prospective and retrospective studies, randomized controlled trials (RCTs), observational studies, and case series addressing burn wound management in children were considered.

Data Sources: Electronic databases including PubMed, Scopus, Web of Science, and Google Scholar were searched using a combination of keywords and Medical Subject Headings (MeSH) terms such as “amniotic membrane dressing,” “burn ulcer,” “pediatric burns,” “wound healing,” “tertiary care,” and “comparative dressing.” Additional studies were identified through reference lists of relevant articles.

Inclusion Criteria

- Studies involving patients of age ≤18 years with burn ulcers.
- Studies comparing AM dressings with other dressing methods, including silver sulfadiazine, hydrocolloid, hydrofiber, and conventional gauze dressings.
- Studies reporting clinical outcomes such as time to wound healing, infection rates, pain scores, need for grafting, and hospital stay.

Exclusion Criteria

- Studies involving adult patients or mixed populations without separate pediatric data.
- Reviews, editorials, letters to editors, and non-English publications.
- Studies with incomplete data on clinical outcomes.

Result and Observation

Branski LK et al 11 (2008) showed that wound coverage for second-degree burns remains a clinical challenge. They presented a novel and standardized procurement and processing method for amnion and investigate, whether the use of this biological dressing is safe and may represent a new therapeutic option for children with partial-thickness facial burns compared to standard topical treatment. Patients with partial-thickness burns of the face, neck and head admitted between 2003 and 2005 were included in that study. They were divided into two groups to receive either amnion (n = 53) or topical antimicrobials (n = 49). Demographics (age, gender, ethnicity, TBSA, burn areas), length of hospital stay (LOS), rate of infections (RI), time to total healing, and frequency of dressing changes were compared between the two groups. The long-term outcome was assessed in nine patients in the amnion group and eight patients in the topical group, who returned for up to 12-month follow-up visits. Patients in the amnion group had significantly less dressing changes then in the control group ($p < 0.05$). Time to healing, length of stay and the development of hypertrophic scarring was not different between the groups. Use of amnion was not associated with an increased risk of local infection. This study indicates that amnion is safe and has advantages as wound coverage for second-degree facial burns compared to the standard topical ointments.

Bujang-Safawi E et al 12 (2010) found that facial burns are common and have a significant impact on patient function and psychosocial wellbeing. Human amnion has been used for many years as a temporary biological wound dressing in the management of partial thickness burns. Their study evaluated their 7 years of working with dried irradiated human amnion in the treatment of facial burns. The effectiveness of the treatment was determined by wound infection rate, frequency of dressing reapplication, healing time and resulting scarring. Thirty-three patients with superficial partial thickness burn were identified (25 males, 8 females). The average age of the patients was 16.5 years (range: 8 months to 64 years). The causes included scalding (n = 15), contact burning (n = 13) and flash burning (n = 5). The mean percent total facial surface area burned was 2.7% (range: 0.5–8.5%). None of the patients developed facial wound infections. Eighty-five percent (n = 28) of the patients needed a single application of the dried amnion. The average healing time was 5.4 days (range: 2–14 days). Thirteen patients (39%) had burns confined to the facial area, of which three were discharged and treated as outpatients. Long-term follow up showed two hypopigmented scars, one hyperpigmented scar and one hypertrophic scar. Superficial partial thickness facial burns can be effectively treated with dried irradiated human amnion membrane.

Ramakrishnan KM et al 13 (2013) observed that collagen based dressings for acute burn wound management have been extensively used in India, particularly in the city of Chennai. Due to the high levels of humidity in our city, closed dressings become infected and treatment with topical antimicrobials, like Silver Sulfadiazine cream, quickly become desiccated. Collagen membrane dressings were manufactured by the biomaterial laboratory of the Central Leather Research Institute (CLRI), Government of India in Chennai, and then the process was patented. Collagen was extracted from bovine skin and Achilles tendons, and then reconstituted. This was used on burn wounds as dressings after clearance from the Institutional Review Board and Ethics Committees of the Hospital and CLRI. Continued research in this field to enable resulted in the design of silver sulphadiazine loaded alginate microspheres which were embedded in the reconstituted collagen. Controlled delivery of silver sulphadiazine. This collagen membrane was used in chronic infected burns. Low molecular weight heparin was given subcutaneously to improve wound healing in burn injuries and collagen membrane dressings were also applied. After several trials the process technology was patented. The advantages and disadvantages of the collagen membrane cover was elaborated in a group of 487 pediatric burn patients. The trial was conducted at the burn unit of KanchiKamakoti Childs Trust Hospital (KKCTH) in Chennai, India. Vloemans AF et al 15 (2014) showed that a large part of the patient population of a burn centre consists of children, most of whom are younger than four years. The majority of these young children suffer from superficial and deep partial thickness scald burns that may easily deepen to full thickness burns. They performed a systematic review of wound management and

dressing materials to select the best treatment option for children with burns. A search in Medline and Embase revealed 51 articles for a critical appraisal. The articles were divided into randomized controlled trials, cohort studies and a group of case-reports. Total appraisal did not differ much amongst the groups; the level of evidence was highest in the randomized controlled trials and lowest in the case-reports. In 16 out of 34 comparative studies, silver sulfadiazine or a silver sulfadiazine/chlorhexidine-gluconate combination was the standard of wound care treatment. The competitor dressing was Biobrane® in six studies and amnion membrane in three. Tulle gauze, or tulle gauze impregnated with an antibacterial addition were the standard of care treatment in seven studies. In general, membranous dressings like Biobrane® and amnion membrane performed better than the standard of care on epithelialization rate, length of hospital stay and pain for treatment of partial thickness burns in children. However, hardly any of the studies investigated long-term results like scar formation.

Ullah MS et al 16 (2015) found that the aim of this study was to find out the effectiveness of amniotic membrane graft dressing in the treatment of superficial partial thickness burn in children. The retrospective study was conducted on the patients admitted with superficial partial thickness burn in the burn unit of Dhaka Shishu Hospital age 0-12 years, during the period from January 1999 to December 2011. All of them treated with amnion membrane graft dressing. Total 370 patients were included in this study. Mean age was 2.76 years. Amnion dressing suppresses bacteria in the wound as well as reduced infection. Amnions have good adherent characteristics, which reduced infection as well as reduction of oozing of plasma from the wound, that become dry early. It has a role on burnt pain reduction, frequency of dressing change, rate of healing, cost, duration of hospital stay. Their experience showed that amniotic membrane is one of the effective biological skin substitutes used in burn wounds, with efficacy of low bacterial counts, has advantageous of reducing protein loss, electrolytes & fluids. Decreasing the risk of infection minimizing pain, accelerate of wound healing and good handling properties. It is cost effective and very helpful for developing countries.

Azzena B et al 18 (2018) explore that Lyell Syndrome (TEN, Toxic epidermal necrolysis) represents a medical emergency particularly in pediatric patients in whom the massive skin damage can quickly lead to multi-organ dysfunction and death. They reported the use of amniotic membranes in a pediatric case of severe Lyell Syndrome with complete skin surface, ocular and mucosal involvement with life threating presentation. A 7-year old female was admitted to Burn Centre for severe cutaneous/mucosal exfoliation (100% Total body surface area, TBSA) as a result of an adverse reaction to ibuprofen administration. Supportive fluid administration, cardiac-pulmonary assistance and pain management were complemented by serial grafting of amniotic membranes on all affected areas to provide coverage of the exfoliated skin/mucosa. Biopsies were obtained to monitor histological skin changes. The patient showed an excellent response to amniotic membrane treatment, with rapid restoration of mucosal and cutaneous layers in the grafted areas. This resulted in a decreased need for dressing changes, avoidance of additional surgeries and a reduced dependence on supportive therapy. Lower pain levels than usually expected led to a reduced need for narcotic pain medications and allowed for early physical rehabilitation and a short hospital stay. Histology confirmed evidence of topical immune-modulation in treated areas (reduction of inflammatory infiltrate).

Puyana S et al 19 (2022) showed that facial burns have lasting physical and psychological effects on pediatric patients. Proper management to minimize morbidities challenges reconstructive surgeons. New technologies allowed the development of skin substitutes such as amniotic and chorionic membranes, yet the use of these skin dressings and their impact on burn outcomes have not been sufficiently studied to guide practices. The objective of their study was to report on the outcomes of dehydrated amniotic membrane as a biologic skin dressing in pediatric facial burn injury compared to cadaveric allografts. The study population included patients younger than 16 years with facial burns. Patients between 2012 and 2014 received cadaveric allografts, whereas during 2015 to 2016 patients received dehydrated human amniotic/chorionic membrane as standard treatment. Demographic characteristics and outcome measures were compared between the 2 groups. Included 30 patients with a mean age of 3.7 years and with an average total body surface area burn of 6.8% (2%–27%). Mean injury severity scores did not significantly differ between both groups, 1.8 in amniotic group versus 2.3 in cadaveric skin group ($P > 0.05$). There were 4 complications (3 hypertrophic scars and 1 wound infection) in the cadaveric allografts group versus no complications in the amniotic membrane group ($P < 0.05$). They concluded that dehydrated amniotic/chorionic membrane wound dressings are a safe alternative to cadaveric allografts in treating pediatric partial thickness facial burns.

Firos Khan A et al 20 (2020) compared between effectiveness of placental dressings over conventional dressings in patients with first and second degree burns. In their study 70 cases were studied with 10-30%TBSA first and second degree

burns allocated to 2 groups. 36 patients received amniotic membrane dressing prepared from human placenta (AM group) and 34 patients received conventional dressing with silversulphadiazine and cuticell (CD group) and assessed for compliance of patient on view of pain, number of dressing changes and time required for epithelialization and hospital stay. In their study mean age in the Amniotic membrane dressing (AM) group is 18.9 years whereas in the Conventional dressing (CD) group is 30.9 years. Among the 36 patients in AM Group had 21 male (58.3%) and 15 female (47.1%) whereas among 34 patients in CD group had 16 males (47.1%) and 18 (52.9%) females and a mean percentage of TBSA first and second degree burns of 18.8% in AM and 21.1% respectively. With a mean Pain score on day 1 post admission of 8.8 in AM group and 8.7 in CD, Pain score on Day 3 in the AM group was 3.5 and CD group is 7.6 with a significant p value. In AM group and CD group, Average total number of dressings used was 1.4 and 15.1, Mean time for epithelialisation is 14.5 days and 21.6 days, Mean hospital stay of 13.2 days and 19.7 days respectively with p value <0.001 which is highly significant. CONCLUSION With this it can be concluded that Amniotic membrane dressings in first and second degree burns are superior to conventional silversulphadiazine dressing in terms of less pain , practically a single application dressing , faster epithelialisation and thereby faster wound healing and a reduced hospital stay.

Yang C A et al 22 (2021) aimed to evaluate the role of AM dressings in burn wounds. A systematic search of the PubMed, Cochrane, Embase, and Web of Science databases was conducted in March 2020. The search was conducted to identify randomized control trials that compared selected features of AM with those of other dressings, such as silver sulfadiazine, polyurethane membrane, and honey. For skin-grafted wounds, they compared AM-covered skin grafts and traditional staple-fixed skin grafts. Outcomes of interest for the efficacy analysis included wound infection, pain, itching, scarring, and healing time. The number of adverse events in each treatment group, the rate of withdrawal because of adverse effects, the cost of treatment, and patient acceptability were assessed for the feasibility analysis. Eleven randomized controlled trials with 816 participants total were identified in our review. Amniotic membrane treatment was more effective than conventional methods, silver sulfadiazine, and polyurethane membrane in treating burn wounds, but AM appears to be less effective than honey. No reports of AM-related disease transmission or adverse reactions were described in the included articles. Amniotic membrane has beneficial effects in treating burn wounds; however, the evidence as per their version needed to be strengthened by further robust randomized controlled trials.

Chakraborty SK et al 23 (2022) showed that radiation sterilized human amniotic membrane allografts are used as biological dressing of wounds in rehabilitative surgery. The amniotic membrane is used in many different clinical situations such as: heat burn, chemical burns, diabetic wound/ diabetic foot ulcer, leprotic ulcer, abdominal wall reconstruction, pterigium removal site, peripheral corneal ulcer, in the management of pressure sore, etc.Non-viable lyophilized/oven-dried radiation sterilized amniotic membrane allografts could be processed for utilization as temporary biological dressing of wounds. The allografts used clinically should not be the carriers of germs or a source of infection. Human chorio-amniotic membranes collected for processing as tissue allografts to be used as biological dressings were reported to be contaminated with microorganisms such as species of Staphylococcus, Micrococcus, Bacillus and Pseudomonas.However, oven dried (40ºC) or freeze dried (-50ºC) human amniotic membranes were found to be sterilized by irradiation with the dose of 25 kiloGray (kGy) of gamma radiation.Careful screening and selection of tissue donors, proper processing and gamma radiation sterilization of human amniotic membranes minimize the risk of disease transmission to recipients through allografts. Lőrincz A et al 24 (2022) found that Paediatric second-degree burn injuries are a significant source of medical challenges to the population that may cause severe, lifelong complications. Currently, there are dozens of therapeutic modalities and we aimed to summarise their reported outcomes and determine their effectiveness, compared to the widely used silver sulphadiazine (SSD). Methods: We conducted the meta-analysis and systematic review of randomised controlled trials (RCTs), which investigated the performance of dressings in acute paediatric partial-thickness burns. The evaluated endpoints were time until wound closure, grafting and infection rate, number of dressing changes and length of hospitalisation. Results: Twenty-nine RCTs were included in the qualitative and 25 in the quantitative synthesis, but only three trials compared SSD directly to the same intervention (Biobrane). Data analysis showed a tendency for faster healing times and a reduced complication rate linked to biosynthetic, silver foam and amnion membrane dressings. A substantial difference was found between the number of dressing changes associated with less pain, narcosis and treatment duration. Conclusions: Considerable between-study heterogeneity was caused by the unequal depth subcategory ratio and surface area of the injuries; therefore, no significant difference was found in the main outcomes. Further research is necessary to

establish the most effective treatment for these burns.

Singh S et al 25 (2023) observed that the restricted donor area in paediatric patients demands the use of Human Amniotic membrane (hAM) in the management of difficult-to-manage wounds. It can be used directly over wounds or used to grow stem cells by different culture methods. The hAM can be used "fresh" i.e., +4O glycerol preserved or "cryopreserved". In this literature review, we searched 'PubMed', 'Web of Science' and 'SCOPUS' for experimental models, RCT, Observational studies, case series, and case reports involving the usage of hAM in the treatment of neonatal and paediatric (<14 yrs.) patients, published in from 1993 to April 2022. The search included the keywords, "amnion", "biomaterials", "biological dressing", "clinical study", "congenital defects", "human amniotic membrane", "paediatric wound", "neonatal wounds", and "regenerative medicine". The Search was extended by snowballing the reference list of all included studies. The final analysis included one experimental RCT, three review articles, and twelve case reports. The experimental studies were in rat, pup, and porcine models. The paediatric second-and third-degree thermal burn followed by paediatric ocular diseases viz corneal epithelial ulcers, conjunctiva reconstruction following Steven Johnson Syndrome, and scarring after surgery of strabismus were the most common indications for the usage of AM. Five cases of meningomyelocele repair (intradural& extradural placement of AM) and 2 cases of gastroschisis repair (as an antiadhesive layer) were reported. Freeze-dried hAM is most frequently used in clinical practice. Autologous HAM was used in antenatally detected birth defects. In the adults, the fresh hAM was found equally effective as freeze-dried AM, but with the risk of transmission of contagious diseases. The literature on Fresh amnion is deficient in paediatric patients. HAM as a skin substitute in paediatric wounds/defects has shown an enhanced rate of healing. However, further studies, regarding the utility of hAM in the management of paediatric wounds, congenital anatomical defects, and diseases along with analysis of outcome and economic constraints in developing countries are needed.

Otaghvar HA et al 26 (2023) explore that amnion implantation in the operating room on children's acute second degree burn wounds in patients referred to Shahid Motahari Hospital in Tehran in 2022-2023. Study method: In this cross-sectional study, which retrospectively examines the results of amniocentesis in children referred to Shahid Motahari Hospital in Tehran in 2022-2023, patient records are examined to collect information. Findings: The information of 203 children under 16 years of age who underwent amniocentesis in Shahid Motahari hospital with 2nd degree burns between 2022 and the end of December 1401 were analyzed. Their average age was 4.86±3.937. 59.6% of the subjects were boys and 40.4% were girls. The average duration of hospitalization was 6.62±4.483 days. 96.1% of the burns happened at home, 1.9% in the park and 1.5% in the street. The frequency of burn percentage of patients is 37.4% in the range of 10-19%, 29.1% in the range of 20-29%, 20.7% in the range of 0-9%, 11.3% in the range of 30-39%, 1% in the range of 40-49%. and 0.5% was in the range of 50-59%. 64.5% of children with boiling water, 12.8% with food, 7.9% with gasoline, 4.4% with flames, 3% with alcohol, 2.5% with gas canisters, 2% with city gas, 2% with flammable materials, 0.5% with coal. And 0.5% were burned by a hot object. 75.4% of patients had trunk burns, 68.5% had arm and forearm burns, 50.7% had head and neck burns, 48.8% had thigh and leg burns, 35% had hand burns, 12.8% had leg burns, and 2% had whole body burns. 20.7% of patients needed grafting during hospitalization. Out of 131 people who suffered scald burns, 27 people needed grafting. Out of 26 people who suffered food burns, 3 people needed grafting. Out of 16 people who were burned with gasoline, 6 people needed grafting.

Kadivar M et al 27 (2023) showed that Extravasation is leakage of material from a peripheral venous access into adjacent tissue, which results in tissue damage ranging from local irritation to necrosis and scar formation. Neonates are at extravasation risk with IV treatment because of their small, fragile veins and the long treatment period required. In this report, investigators assessed the efficacy of amniotic membrane (AM) as a biological dressing to heal extravasation wounds in neonates.

This case series includes six neonates who presented with extravasation injuries from February 2020 to April 2022. Neonates born at any gestational age diagnosed with a wound secondary to extravasation were recruited. Neonates with skin disorders and those who had stage 1 or 2 wounds were excluded. Providers covered infection- and necrosis-free wounds with AM and assessed the wounds after 48 hours. Five days after placement, providers removed and replaced the AM; they continued to replace the bandages every 5 to 7 days until healed. The average gestational age of included neonates was 33.6 weeks. Average healing time was 12.5 days (range, 10-20 days), and no adverse reactions were observed. All neonates healed completely without scar formation. This preliminary report suggests that the application of AM in treating extravasation in neonates is safe and effective. However, controlled trials with larger sample sizes are needed to

evaluate this outcome and determine implications for practice.

Ingraldi AL et al 28 (2023) found that biological tissues from various anatomical sources have been utilized for tissue transplantation and have developed into an important source of extracellular scaffolding material for regenerative medicine applications. Tissue scaffolds ideally integrate with host tissue and provide a homeostatic environment for cellular infiltration, growth, differentiation, and tissue resolution. The human amniotic membrane is considered an important source of scaffolding material due to its 3D structural architecture and function and as a source of growth factors and cytokines. This tissue source has been widely studied and used in various areas of tissue repair including intraoral reconstruction, corneal repair, tendon repair, microvascular reconstruction, nerve procedures, burns, and chronic wound treatment. The production of amniotic membrane allografts has not been standardized, resulting in a wide array of amniotic membrane products, including single, dual, and tri-layered products, such as amnion, chorion, amnion–chorion, amnion–amnion, and amnion–chorion–amnion allografts. Since these allografts are not processed using the same methods, they do not necessarily produce the same clinical responses. The aim of this review is to highlight the properties of different human allograft membranes, present the different processing and preservation methods, and discuss their use in tissue engineering and regenerative applications.

Franco PA et al 29 (2025) observed that Non-fatal burns are a global health issue with a considerable impact on morbidity as well as aesthetic and functional sequelae. Facial burns in neonates are rare and often occur in hospital settings due to medical devices. Due to its regenerative potential, the amniotic membrane has been used as an alternative treatment for superficial and partial-thickness burns. This report documents the successful use of the amniotic membrane in treating a third-degree burn on the nasal tip of a preterm newborn.

Case presentation and A male newborn at 33 weeks of gestation was admitted to the neonatal care unit and presented with a third degree burn on the tip, right ala, and columella of the nose, secondary to the use of malfunction on the temperature modulator of a ventilation mask. Initially, the use of hydrogel and dressings with Fitostimoline applied on the injury helped to partially eliminate the necrotic tissue, and then an amniotic membrane was placed on the injury. The 8-month follow-up showed adequate epithelialization without nasal collapse and a satisfactory aesthetic outcome were observed, although there was a slight loss of nasal tip projection. This case report demonstrates the effectiveness of the amniotic membrane in the healing process of nasal burns in neonates by improving wound healing and contributing to fibrosis reduction, due to its richness in growth factors and cytokines. Its anti-inflammatory and bacteriostatic effects contribute to pain control and reduce microbial proliferation, optimizing aesthetic outcomes. In combination with other dressings, the amniotic membrane promotes neovascularization and epithelialization preventing significant deformities. The amniotic membrane is an effective alternative for treating neonatal facial burns, minimizing tissue damage and preserving nasal anatomy. This case report results highlight the importance of a multidisciplinary approach in treating facial burns, integrating surgical techniques and advanced wound care technologies to achieve adequate functional and aesthetic outcomes. However, long-term follow-up will establish the need for additional procedures and the evolution of the nasal anatomy.

Jabarkhyl D et al 30 (2025) explore that burn injuries in the paediatric population are common and account for a substantial proportion of hospital attendances, leading to a growing focus on optimising wound care to enhance healing, reduce discomfort and minimise the need for frequent dressing changes. Traditional dressings for superficial burns in children have inherent limitations that may hinder these goals. Biobrane (Dow Hickman/Bertek Pharmaceuticals, Sugar Land, TX), a semi-permeable silicone device embedded with a nylon mesh and a porcine-derived collagen matrix, offers a promising alternative with advantages such as improved wound healing, reduced pain and fewer dressing changes. This systematic review and meta-analysis, conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, assessed the efficacy of Biobrane by analysing data from MEDLINE, PubMed, EMCare, Cochrane Cochrane Central Register of Controlled Trials and additional clinical trial registries up to 8 June 2024. Primary outcomes included burn wound healing time, hospital length of stay and infection rate, while secondary outcomes assessed the need for split-thickness skin grafts (STSGs), pain and the number of dressing changes. Data synthesis using the Open Meta Analyst software (Brown University, Providence, RI) encompassed 781 burn wounds across 12 studies. The results showed that Biobrane significantly shortened wound healing time (mean difference, MD: 5.168 days, $p = 0.001$) and hospital length of stay (MD: 2.009 days, $p < 0.001$) compared to standard dressings. The infection rate was comparable (odds ratio, OR: 2.457, $p = 0.132$), and there was no difference in the requirement for STSGs (OR: 0.965, $p = 0.956$). This systematic review and meta-analysis demonstrate that Biobrane is an effective treatment

for superficial paediatric burn injuries, offering faster wound healing, reduced pain and shorter hospital stays compared to traditional dressings.

Discussion

The use of human amniotic membrane (AM) as a biological dressing in paediatric burn care—especially within tertiary healthcare setups—demonstrates several clinically meaningful advantages over conventional methods like silver sulfadiazine (SSD), paraffin gauze, polyurethane, and nitrofurazone-impregnated dressings.

First, AM significantly reduces hospital stay and dressing change frequency, enhancing patient comfort and decreasing caregiver workload. In a tertiary centre study of paediatric scald burns, early AM application led to markedly shorter admissions and fewer dressing changes; notably, none of these patients required grafting, in contrast to the wet collagen and paraffin gauze group [31]. In a randomized trial involving 102 children (ages 1 day to 12 years) comparing radiation sterilized AM to SSD, AM was associated with significantly shorter hospital stays, fewer dressing changes, and faster epithelialization of both superficial and deep second degree burns; moreover, AM was painless, well accepted by both patients and caregivers, and easy for physicians to apply [32].

Secondly, wound healing outcomes are consistently superior with AM. A 2025 systematic review and meta-analysis encompassing 11 trials (n = 971) reported that AM significantly shortened mean healing time, enhanced wound healing rates, lowered infection incidence, and reduced dressing renewal frequency compared to controls [33]. A broader meta-analysis of 11 randomized controlled trials across various dressings (including SSD and polyurethane) reaffirmed that AM outperformed conventional dressings in healing efficacy, though honey showed even greater effectiveness [34].

Thirdly, when compared with SSD ointment, AM demonstrated superior performance in a recent open-label randomized trial focused on second-degree thermal burns. By days 7, 14, and 30, patients treated with AM experienced significantly better epithelialization, reduced scarring and pigmentation, less pain, and shorter hospital stays, though at a higher treatment cost ($170 vs $71) [35].

Beyond immediate healing metrics, AM offers additional biological and mechanistic benefits. Compared with bioengineered skin substitutes, propensity score–matched analyses suggest that AM may reduce hypertrophic scarring, wound dehiscence, local infections, and postoperative pain, likely due to its rich composition of growth factors, cytokines, extracellular matrix proteins, and immunomodulatory molecules that support re-epithelialization, modulate TGF-β signaling, promote M2 macrophage response, and provide scaffolding for cell migration [36].

AM has also been successfully applied to split-thickness skin graft donor sites, with studies showing faster healing, reduced pain and fewer dressing changes, and equal or better cosmetic outcomes compared to conventional dressings like Vaseline gauze. These findings were consistent across randomized trials and systematic reviews [37][38]. Roy I et. al observed that apart from children, in adults also freshly collected amniotic membrane application has been found to modulate inflammatory status and a quick transition from an inflammed, non-healed wound bed to a mature, epithelialized and remodeled tissue. [33]

Lastly, AM dressings have been generally safe, with no documented adverse reactions or disease transmission in the reviewed literature [34]. However, higher cost remains a potential barrier, as highlighted in comparative studies with SSD [35].

Conclusion

In conclusion, amniotic membrane dressings offer significant clinical advantages over conventional dressing methods in the management of pediatric burn ulcers within tertiary healthcare settings. Their inherent anti-inflammatory, antimicrobial, and regenerative properties contribute to faster healing, reduced pain, and decreased frequency of dressing changes, which are particularly beneficial in pediatric care. While traditional methods remain widely used due to availability and familiarity, the growing body of evidence supports the integration of amniotic membrane therapy as a safe, effective, and child-friendly alternative. Further large-scale, controlled studies are warranted to standardize protocols and enhance accessibility, ensuring optimal outcomes in pediatric burn care.

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