

Use of bio-cellulose gel and a bio-cellulose nano-structured matrix as palliative care in a hard to heal chronic wound

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Background

The improved understanding of the physiology of wounds and the processes involved in wound healing has resulted in a change of understanding as regards the wound environment and healing.

Previous non-healing wounds were assumed to have a deficiency in the epithelial cells, it is now excepted that it more a problem of a deficient or non-existent Extra Cellular Matrix (ECM) which is the major issue in static non healing chronic wounds.

A novel hemicellulose membrane and a fiberpolysaccharide gel made of plant stem cells with a nano-fiber delivery system, used for wound palliative care in chronic non-healing wounds is described

Methods:

A natural bio-cellulose gel and a bio-cellulose nano-structured matrix wound dressing was evaluated in a palliative case study.

The bio-cellulose gel and a bio-cellulose nano-structured matrix dressing was applied to the cleansed wound site and covered with a sterile gauze with 2-3 dressing changes per week.

The wound was observed closely for any signs of healing initiation and epithelialization.

Results:

The natural dressing used stimulate this chronic wounds halted in the inflammatory state of wound healing to progress to a proliferative state.

The application of a bio-cellulose gel and a bio-cellulose nano-structured matrix dressing, decreases periwound edema and stimulate this extremely hard to heal wound (even if it doesn't bring complete closure), facilitating palliative wound care in this scenario, despite the used of concomitant radiation therapy.

No adverse effects were reported.

Conclusion:

Further studies are needed to determine if the natural dressing is applicable in other acute and chronic wound settings or may have potential anti tumor properties.

Case study

72 year old male.
Squamous cell carcinoma.
3 month evolution.
Exposed bone.
Epithelialization over bone observed at 2 day with edema reduction.



Initial



Nanogen Aktiv applied



2 Day

Nano-structured matrix dressing was applied previous to radiotherapy.
Matrix kept integrate.



Day 2



Day 6 After radiotherapy



Day 15

The bio-cellulose gel and bio-cellulose nano-structured matrix joint treatment, move wounds into a proliferative stage of wound healing despite radiation treatment.
This treatment provides an alternative to palliate wound management.



Day 31



Day 36



Day 45

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Use of a Novel, Bio-Cellulose Nano-structured Gel (Nanogen Gel™) to Treat a Traumatic Abdominal Wound in a Paraplegic Male.

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GENADYNE
ADVANCED TECHNOLOGIES IN WOUND CARE

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50 year –old male with T5-level paraplegia presented with a new onset of a traumatic abdominal wound. He had a moderate abdominal pannus and so was unaware of it's presence until he identified copious drainage on his clothing over several weeks. He did not self treat but immediately came to the clinic for evaluation. The cause was identified as a new, woven leather belt that he had worn with his pannus sitting on top as he engaged in his activities of daily living. The Nanogen Gel was applied in a thin layer to the wound and covered with a semi-absorbent island dressing and changed three times a week. The abdominal wound demonstrated remarkable healing as shown.

Nanogen is a Bio-Cellulose nano-structured membrane synthesized by a bacterial strain *Acetobacter Xylinum* through a fermentation process. The membrane can be applied directly or converted into a gel matrix for use on multiple types of wounds. Early studies suggest this novel product has excellent potential in promoting healing in otherwise recalcitrant wounds.



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A CLINICAL EVALUATION OF A BIOCELLULOSE MEMBRANE DRESSING IN NEUROPATHIC AND NEURO-ISCHAEMIC ULCERATION

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Background and Aims

The diabetic foot ulcer is a major cause of lower limb amputation^{1,2}. When foot ulcers do not respond to basic treatment then advance treatments such as extracellular matrix proteins may offer an alternative¹. Aim to see if Nanogen bio cellulose products heal previously unhealed chronic wounds in a cost effective manner.

Method Patients with foot ulcers that had failed to heal in six months or more were evaluated for 2 - 4 weeks A full holistic assessment was undertaken :-gender, age wound type, underlying comorbidities. Wounds were measured and photographed at every dressing change with observations on peri-wound skin, exudate type and colour. Secondary dressing and off-loading were applied at the discretion of the multidisciplinary team. All patients were reviewed regularly. All patients documented length of treatment and estimated cost to date.

Results 4/20 patients had neuroischaemic, neuropathic or mixed aetiology ulcers the mean non-healing time prior to evaluation 92 days, Mean to time to healing 14.25 days.. Using a conservative cost model, this small sample demonstrated cost efficiencies compared to maintaining the wound. **Conclusion** Nanogen Aktiv appeared to kick start hard to heal wounds. It mimics the wound ECM and stimulates epithelialisation and improves inter cellular signalling, both of which have been shown to be critical in stimulating the healing of neuropathic and neuroischaemic foot ulcers. . Nanogen healed 18 out of 20 previously unhealed wounds .F

Case study Example.

54 year old insulin dependent diabetic presented with ulceration to his right hallux of 8 weeks duration. He been given broad spectrum antibiotics but the wound had failed to improve. On examination he had full complement of foot pulses with good biphasic Doppler signals. His Right Hallux was grossly oedematous with a necrotic area on dorsal and plantar aspect of his phalangeal joint. These appear to be connected. He had a ray amputation of the right hallux on 18th September 2015 he was admitted to the hospital with an abscess associated with sepsis third right toe, a foreign body was surgically removed following debridement he was given systemic antibiotics Flucloxacillin. Nanogen (Genadyne Pharma)was applied as a primary dressing with secondary dressing of Mepore® (Molnlycke Health Care. 23rd September he developed a sinus of the right plantar, topical negative pressure was applied maintaining a seal continued to be a challenge and this affected his quality of life. The patient then requested a return to Nanogen and mepore combination. He continued to comply with offloading, and he went on to heal successfully within 2 months.

References

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- 2 Lauterbach s,Kostev K, Kholman T, (2010) Prevalence of Diabetic Foot syndrome and its risk factors
Journal of Wound Care Vol 19 No 8 August 2010 pp 333-337



Image 1 18th September 2015, On referral to wound care team following surgery



Image 2, 23rd September 2015, 5 days following Nanogen application haemoserous exudate, granulating wound bed.



Image 3, 14th October 2015, 25 days following Nanogen application, rapid epithelisation



Image 4 21st October 2015 almost healed

BIOCELLULOSE NANO-STRUCTURED MATRIX AS PRIMARY WOUND HEALING DRESSING IN SKIN LESIONS OF A PATIENT WITH TOXIC EPIDERMAL NECROLYSIS OR LYELL’S SYNDROME

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Introduction

Several treatments have been used in skin lesion of patients with TEN. The aim of this case is to describe the outcomes obtained using a biocellulose nano-structured matrix in a patient admitted to the Intensive Care Unit with a Lyell’s Syndrome or toxic Epidermal Necrolysis (TEN) This disease is a unique rapidly developing mucocutaneous reaction pattern, characterized by sheets of erythema, necrosis and bullous detachment of the epidermis, closely resembling that of scalding of the skin and rapidly fatal, was described by Lyell, and is now recognized as toxic epidermal necrolysis (TEN) Lyell's syndrome. Drug-induced hypersensitivity syndrome was rule out in this case.(1)

Material and methods

Data from 1 patient admitted at the Intensive Care Units at Hospital Mexico, Costa Rica was collected. Time to complete healing. demographic data, co-morbidities, concomitant medications, time to healing, length of stay and complications were addressed.

Results

A 25 year old man was admitted to Hospital Mexico’s Intensive Care Unit, in a single isolated room and in a controlled microbial environment, with an extended cutaneous rash, with mucositis affecting conjunctivas, oral mucosa and genitalia. It has facial and body crusts with erosions. The patient has history of taking sulfasalazine for his CUCI, ____ days prior to the onset of skin manifestations. The area of bullae some already torn and sloughing cover 42 % of BSA. Nikolsky’s sign was positive Initial laboratory studies showed: hepatitis with elevations of his AST (which peaked at 201 mg/dL) and ALT (300 mg/dL) LDH (338mg/dL), total bilirubin(1.83 mg/dL), leucopenia (4.08x103/uL, 76% neutrophils, 14 % lymphocytes, 0.5% eosinophils, 0.3% basophils). A Positive IgG quantification for Herpes Virus 1-2, Varicella Zoster Virus and CMV (all with negative IgM quantifications and a negative viral quantification for CMV), his initial C reactive protein and procalcitonin levels were 160 mg/dL and 0.3 ng/dL, respectively. Treatment consisted in rehydration and plasmapheresis (#8 sessions using both 5% albumin and fresh frozen plasma, with an average processed volume of 6000mL) for 8 days. He received orals steroids with a 10mg dose of prednisolone for 15 days and empirical coverage with iv linezolid for 14 days. Nonetheless he presented bacteriemia and K. pneumoniae (a non-resistant strain) was isolated and treated successfully with a 7 day course of cefotaxime.

The skin lesions were painful and treated with vaseline gauze and chlorhexidine for the first week.

Once the exudation ceased, Nanogen (a biocellulose nano-structure matrix made from organic nano-fibre.) was applied on denuded areas, covered with a non-adherent dressing and in some areas leave it without secondary dressing. Spontaneous detachment of Nanogen occurs at 10 days with complete wound healing. The patient returned to normal values in his his leucogram (5860/uL), hepatic enzymes (ast: 34 mg/dL, ALT: 43) and bilirubin (total bilirubin: 0.97)

Patient was discharged from the ICU after 14 days, admitted to the gastroenterology ward to continue management for his inflammatory bowel disease.

Conclusions

The findings suggest that the use of biocellulose nano-structured matrix may provide a scaffold to enhance granulation and wound healing in patients with TEN. This dressing adapts very well to the face contour, including nose and ears, and genitalia. It protects the area against infection, reduce scar formation and due to the fast recuperation time, may reduce cost of treatment. A decrease in dressing changes, fluid losses and pain was obtained. The patient comfort increase and wound care was easily performed. Nanogen provide a very effective skin coverage helping to reduce pain and facilitating wound healing in a short period of time, without side effects and excellent tolerability

Around 7th day, the main complaint with the biocellulose dressing was face itching due to dryness of the dressing, and it detach around 10th day. Biocellulose dressing may be a useful adjunct in the management of TEN.

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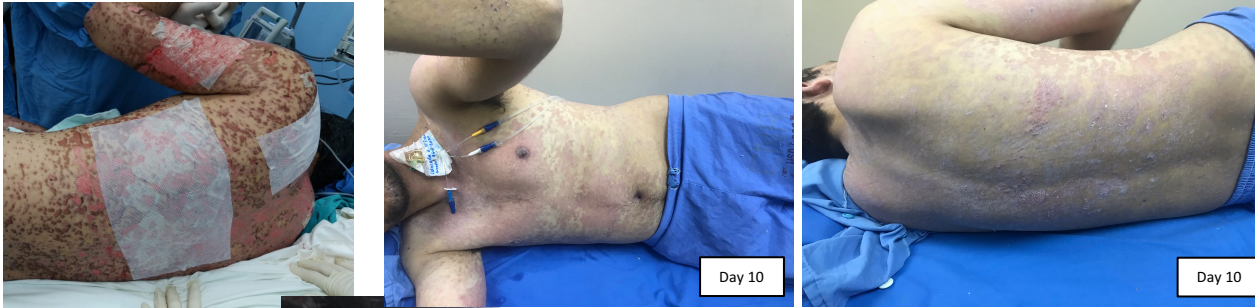
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BIOCELLULOSE NANO STRUCTURED MATRIX AS PRIMARY WOUND HEALING MODALITY MANAGING PARTIAL THICKNESS FACE BURNS

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Introduction

Several treatments have been used in local burn management. The aim of this case series is to describe the outcomes obtained using a biocellulose for second degree (superficial partial thickness) face burns. In 7 patients with superficial partial thickness face burns a biocellulose dressing was applied. Time to healing, length of stay (in the hospitalized patients)and complications were addressed.

Material and Methods

Data from 7 burn patients was collected. 6 inpatients and 1 outpatient. 6 patients were admitted at the Intensive Care Units at Hospital Mexico, Costa Rica and 1 patient was managed as outpatient. Outcome include time to complete healing. Demographic data, co-morbidities, concomitant medications, time to healing, length of stay and complications were addressed. Dressing Material A natural biocellulose nano structured matrix wound dressing with a bacterial and plant cellulose structure. The plant cellulose is sustainably harvested and the bacterial cellulose is derived from Acinetobacter Xylinum. This dressing is also a natural antimicrobial.¹

Results

Characteristics of the population are describe in table 1.

Of 7 patients evaluated 4 patients were male and the median age was 38 (15-75) years and 3 patients were female and the median age was 43 (32-54) Prior to biocellulose dressing 4 patients receive silver sulfadiazine with vaseline gauze and 3 patients fusidic ointment with vaseline. Mean duration prior to treatment was 2 days. All patients were surgically debrided if needed. All the patients had one application of the biocellulose. The median number of sheets (10 cm x10 cm) per patient was 1(1-2) No secondary dressing was applied in the face burns. On 6 patients pain relief was assessed and achieved after application. of the biocellulose dressing. One patient on ventilator support and sedated was unable to be assessed for pain.

All patients healed at interval 2-3 weeks. Healing took place at a mean 12 days. The median healing time (final wound closure) for burn patients treated with biocellulose was 10 (7-23) days. The median duration of hospital stay was 15 (4-22) days. The extent of burns as TBSA i (Total Body Surface Area) shown in table 1. Although patients had burns in other areas besides head and neck. Only face and neck areas were treated with the biocellulose dressing Patients received antibiotics unrelated to their burns. Complications cannot be attributed to the use of the biocellulose dressing

Limitations

A small sample size and the lack of a control group to compare outcomes. In order to have a solid evidence a randomized controlled trial is needed

Conclusions

The findings suggest that the use of a biocellulose may provide a scaffold to enhance granulation and wound healing in burn patients. This dressing adapts very well to the face contour, including nose and ears, protects the area against infection, reduces scar formation and due to the fast recuperation time, may reduce cost of treatment. Around 7th day, once patients were without ventilator support, the main complaint with the biocellulose dressing was face itching due to dryness of the dressing. Biocellulose dressing may be a useful adjunct in the management of second degree face burns. We speculate that it may also be theraputic to apply after face dermatological procedures such as facial peeling

¹ References; Ross,P, Mayer,R and Benziman,M. 1991 Cellulose Biosynthesis and function in bacteria. Microbiological Reviews V.55n1p35-50. BrownJrRM, Willison JHM, RichardsonCL, Cellulose biosynthesisin Acetobactor Xylinium ProcNat Acad Sci USA 1976 73:(12) ;4565 -9

CASE SERIES



Patient	Face Burn Degree**	TBSA*	Age	Sex	Time to complete healing (Days)	Hospital length stay (Days)	Complications
1	2nd	10,5	32	F	23	4 outpatient visits	None
2	2nd	31,5	54	F	14	22	Died (IH Pneumonia)
3	2nd	13,5	15	M	7	10	None
4	2nd	24,5	55	M	10	15	None
5	2nd	44		M	10	20	Bacteremia S Aureus. Fungemia
6	2nd	41,5	21	M	7	11	Died (Hypovolemic shock in surgery)
7	2nd	32,5	75	M	10	16	None

*Face involvement in all patients was 4,5 TBSA
** Patients 1-5 had also 2nd degree burns in chest and extremities. Patients 5 and 6 had 3rd degree burns in chest and extremities