

Utility of decellularised urinary bladder extracellular matrix in full mucosalisation of a post-oncological maxillectomy defect

N. Graillon, A.D. Le, B.M. Chang, R.M. Shanti

▶ **To cite this version:**

N. Graillon, A.D. Le, B.M. Chang, R.M. Shanti. Utility of decellularised urinary bladder extracellular matrix in full mucosalisation of a post-oncological maxillectomy defect. British Journal of Oral and Maxillofacial Surgery, 2020, 58 (10), pp.e323-e325. 10.1016/j.bjoms.2020.08.093 . hal-03185629

HAL Id: hal-03185629
https://amu.hal.science/hal-03185629

Submitted on 2 Jan 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

Version of Record: https://www.sciencedirect.com/science/article/pii/S026643562030485X
Manuscript_c7c16a041d12c442da49e598a191a371

Utility of Decellularized Urinary Bladder Extracellular Matrix in Full Mucosalization of a Post-Oncologic Maxillectomy Defect

Nicolas Graillon, M.D.[1], Anh D. Le, D.D.S., Ph.D.[2], Brian M. Chang, D.D.S.[3], and Rabie M. Shanti, D.M.D., M.D.[4]

[1] Fellow, Aix Marseille Univ, APHM, IFSTTAR, LBA, CHU Conception, Department of Oral and Maxillofacial Surgery, 147 boulevard Baille, 13005 Marseille, France

nicolas.graillon@ap-hm.fr

[2] Chair and Professor of Oral and Maxillofacial and Pharmacology, School of Dental Medicine, University of Pennsylvania, 3400 Civic Center Boulevard, Philadelphia, PA19104, United States

anh.le@pennmedicine.upenn.edu

[3] Director of Maxillofacial Prosthodontics, Department of Oral and Maxillofacial and Pharmacology, School of Dental Medicine, University of Pennsylvania, 3400 Civic Center Boulevard, Philadelphia, PA19104, United States

brian.chang@pennmedicine.upenn.edu

[4] Assistant Professor of Oral and Maxillofacial and Pharmacology, School of Dental Medicine, University of Pennsylvania, 3400 Civic Center Boulevard, Philadelphia, PA19104, United States

rabie.shanti@pennmedicine.upenn.edu

Contact Author

Nicolas Graillon, MD

Secrétariat de Chirurgie Maxillo-faciale
CHU Conception
147 boulevard Baille 13005 Marseille
Email: nicolas.graillon@ap-hm.fr
Phone: +33491435520
Fax: +33491435422

© 2020 published by Elsevier. This manuscript is made available under the CC BY NC user license
https://creativecommons.org/licenses/by-nc/4.0/

Utility of decellularised urinary bladder extracellular matrix in full mucosalisation of a post-oncological maxillectomy defect

Abstract

This report highlights the utility of MatriStem Surgical Matrix Thick UBM™ (rebranded as Gentrix® ACell, Inc), a decellularised urinary bladder extracellular matrix in the reconstruction of a post-oncological maxillectomy defect. In utilising this biological construct to serve as a biological dressing, our patient underwent complete mucosalisation of his surgical site without the development of an oroantral fistula and with adequate maxillary vestibule to allow for definitive oral rehabilitation with a removable partial denture.

Keywords: urinary bladder extracellular matrix, MatriStem, maxillary reconstruction

Introduction

While the use of bioengineered skin and soft tissue substitutes has been well established in the reconstruction of cutaneous defects of the head and neck, their utility in oral mucosal reconstruction is not as well defined. Therefore, we describe the application of a decellularised porcine urinary bladder matrix in maxillary reconstruction.

Case report

The patient was an 83-year-old man with a biopsy-proven diagnosis of squamous cell carcinoma of the right maxillary gingiva, which had been initially staged as cT2N0MO. He had never smoked, and had a past medical history significant for coronary artery disease, carotid

artery stenosis, hyperlipidaemia, and hypothyroidism. He was planned for primary tumour extirpation and personally elected for management of the primary site and against an elective neck dissection, and his reconstructive preference was for a prosthetic obturator. Following completion of his maxillectomy, a Brown Class 1d defect was created.[1] Due to the cancerous lesion being limited to the attached gingiva during the maxillectomy procedure, the integrity of the nasal mucosa was maintained as much as possible and a small area of laceration (Fig. 1) was noted with the advancement of an ipsilateral buccal fat pad pedicled flap. Subsequently the eight-layered Gentrix® was hydrated as per the manufacturer's recommendation (minimum hydration time of 20 minutes with appropriate orientation of the construction). Inset of the construct was performed using absorbable sutures (Fig. 2) with the application of an overlying Xeroform (Covidien) gauze bolster. Of note, informed surgical consent was obtained for the use of xenogeneic material to ensure that the patient had no personal or religious restrictions on use of a pig-derived material, which was included in his consent form. The bolster was maintained for two weeks and subsequently removed without exposure of bone with a small pinpoint fistula along the mid-portion of the surgical site, which would eventually mucosalise (Fig. 3).

While the bolster was in place, a nasogastric feeding tube was maintained and then removed on the first postoperative visit with the delivery of a transitional obturator. Nine months' after operation, the patient was without evidence of local, regional, or distant disease, had a transitional removable partial denture, was without symptoms consistent with nasal regurgitation, and was also without speech impediments when not wearing his oral prosthesis.

Discussion

Our report highlights the utility of a commercially available, off-the-shelf product, which is a urinary bladder matrix (UBM) that allows for successful mucosalisation of a post-oncological maxillectomy defect. The use of this biological construct achieved an optimal result for our patient and avoided any prolongation of his surgery and recovery due to concerns for his overall medical condition. His reconstructive outcome allowed for the maintenance of the vestibule without any tethering of the lip or loss of vestibular depth, to achieve a full oral rehabilitation with a removable prosthesis. We had a similar favourable outcome using a biological construct as Hazarika et al,[2] who had used a lyophilised amniotic membrane to cover a post-maxillectomy defect.

The major advantage of UBM is that it consists of two layers: the superficial surface which is the basement membrane layer that serves as a barrier between the epithelium and the normal tissue (as well as support for growth of epithelial population of cells); and the second layer, which is deeper (facing the recipient bed) and corresponds to the lamina propria and facilitates the integration of native tissues from within the bed of the defect.[3] In essence, the decellularised porcine urinary bladder matrix act as a biodegradable scaffold that maintains a structure for the formation of new tissue, and the delivery of cells.[4] The biomechanical properties of UBM are afforded by a mixture of structural and functional proteins such as type I collagen, type IV collagen, fibronectin, and glycosaminoglycans.[5–7] Moreover, the physicochemical properties of UBM offer attachment sites for cell surface receptors and a reservoir for signalling factors that modulate various wound healing processes, such as angiogenesis, cell migration, and proliferation.[3,5,8]

In conclusion, we have described a novel application of the use of a commercially-available decellularised urinary bladder extracellular matrix in the reconstruction of a post-

oncological maxillectomy defect creating a prosthetically favourable site for dental rehabilitation and also without the dependence of a patient on a prosthetic obturator due to the absence of an oroantral fistula.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patient's permission

Not applicable.

References

1. Brown JS, Shaw RJ. Reconstruction of the maxilla and midface: introducing a new classification. *Lancet Oncol* 2010;**11**:1001-8.

2. Hazarika K, Adhyapok AK, Debnath SC, et al. Simple method of covering maxillectomy defects with lyophilised amniotic membrane. *Br J Oral Maxillofac Surg* 2017;**55**:851-2.

3. Shanti RM, Smart RJ, Meram A, et al. Porcine urinary bladder extracellular matrix for the salvage of fibula free flap skin paddle: technical note and description of a case. *Craniomaxillofac Trauma Reconstr* 2017;**10**:318-22.

4. Guo J, Chen H, Wang Y, et al. A novel porcine acellular dermal matrix scaffold used in periodontal regeneration. *Int J Oral Sci* 2013;**5**:37-43.

5. Badylak SF. The extracellular matrix as a scaffold for tissue reconstruction. *Semin Cell Dev Biol* 2002;**13**:377-83.

6. Brown B, Lindberg K, Reing J, et al. The basement membrane component of biologic scaffolds derived from extracellular matrix. *Tissue Eng* 2006;**12**:519-26.

7. Marçal H, Ahmed T, Badylak SF, et al. A comprehensive protein expression profile of extracellular matrix biomaterial derived from porcine urinary bladder. *Regen Med* 2012;**7**:159-66.

8. Melville JC, Bennetts NA, Tijerina L, et al. The use of acellular urinary bladder matrix as coverage for fasciocutaneous free flap donor sites: an alternative to traditional grafting procedures. *J Oral Maxillofac Surg* 2017;**75**:2254-60.

Figure legends

Fig. 1. Intraoperative clinical photograph of the resection bed with identification of the nasal mucosa (asterisk).

Fig. 2. Intraoperative clinical photograph following the inset of Gentrix®.

Fig. 3. Complete mucosalisation of maxillectomy defect without exposed bone or oroantral fistula six months postoperatively.





