

Biodegradable Temporizing Matrix in Postoncological Scalp Reconstruction: A Case Series

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Summary: Biodegradable temporizing matrix (BTM) is a synthetic biodegradable dermal matrix that helps develop a non-skin graft amenable wound bed (eg, over tendon or bone) into a graftable wound bed, by acting as an inert scaffold for angiogenesis and formation of granulation tissue. There is currently a paucity of evidence to encourage its use in scalp defects following skin malignancy excision. This retrospective analysis aimed to evaluate the utility of BTM in this patient subset. This is a case series of patients undergoing BTM reconstruction for scalp defects following skin malignancy excision between January 2022 and January 2024. Data collected included demographics, as well as oncological and reconstructive outcomes. Thirteen distinct BTM cases were identified in 12 patients. All patients were male with a median age of 85 years. Of 13 lesions, 10 were confirmed squamous cell carcinoma, with 3 confirmed as malignant melanoma. Of 13 cases, 12 required excision down to the calvaria, with 1 down to pericranium. Of 13 cases, 11 went on to receive a split-thickness skin graft (STSG) after BTM application, with a median interval of 46 days. All these patients had complete take of their subsequent STSG. Two cases did not receive STSG, 1 had satisfactorily healed upon delamination of the BTM, and 1 had failure of BTM due to bacterial colonization. This study demonstrates the utility of BTM as a successful, low morbidity reconstructive option in patients undergoing skin cancer excision on the scalp. (*Plast Reconstr Surg Glob Open* 2025; 13:e6497; doi: [10.1097/GOX.0000000000006497](https://doi.org/10.1097/GOX.0000000000006497); Published online 28 January 2025.)

Reconstruction of the exposed calvaria following oncological resection of skin cancer can be challenging; many defects are not amenable to simpler efforts, including direct wound closure due to excessive skin tension or skin grafting due to an inadequately vascularized wound bed. This forces the reconstructive surgeon into more complex routes, including large locoregional or even microsurgical flap reconstructions. These are further complicated by issues such as a potential need for further oncological excision, as well as a population of patients that lean toward frailty and/or comorbidity.

Dermal substitutes are a recent addition to the reconstructive armamentarium, which aim to provide a scaffold for the development of a “neodermis” that can be allowed to heal via re-epithelialization or be covered by a split-thickness skin graft (STSG).¹

Different iterations of these (eg, Integra, Matriderm) have been used in scalp reconstruction following skin cancer excision, with favorable oncological and aesthetic outcomes.² Infection is a common reason for failure of dermal substitutes.³ Polynovo Novosorb bioabsorbable temporizing matrix (BTM) is a purely synthetic dermal matrix composed of a sealing membrane outer layer and a polyurethane open cell foam, developed for use in burn surgery.⁴ As it contains no biological components, it has proven cheaper than Integra⁵ and, theoretically, may pose a lower infection risk; however, this needs to be demonstrated in further trials.⁶

BTM is currently limited to case reports in postoncological scalp reconstruction.⁷ This article aimed to report on a series of cases of BTM use in scalp reconstruction.

METHODS

This case series included patients undergoing skin cancer excision surgery with BTM reconstruction for the scalp from January 2022 to November 2023. Patients were included if they underwent excision of skin cancer with application of BTM; this was generally patients in whom excision down to bare cranium was warranted. Patients without documented follow-up of both oncological and wound outcomes were excluded.

Disclosure statements are at the end of this article, following the correspondence information.

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Received for publication March 14, 2024; accepted December 4, 2024.

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DOI: [10.1097/GOX.0000000000006497](https://doi.org/10.1097/GOX.0000000000006497)

Table 1. Patient Demographics

Patient No.	Sex	Age (y)	Skin Cancer Subtype	Location on Scalp	Excision Depth	Margin Status	Size of Defect (cm)
1	M	78	SCC	Vertex	Calvaria	Complete	8 × 7
2	M	88	SCC	Frontal	Outer table burring	Disease at lateral margin	6 × 5
3	M	85	Spindle cell MM	Right parietal	Calvaria	Complete	8 × 4
4	M	89	SCC	Vertex	Pericranium	Complete	6 × 5
5	M	90	MM	Left parietal	Calvaria	MMIS at 3 "0" clock margin	4 × 4
6	M	94	Sarcomatoid SCC	Frontal scalp	Calvaria	Complete	10 × 8.5
7	M	77	Desmoplastic MM	Frontal scalp	Outer table burring	Complete	8 × 5
8	M	76	SCC	Left parietal	Calvaria	Complete	3 × 3
9*	M	80	SCC	Left frontal	Calvaria	Complete	2 × 2
9*	M	80	SCC	Vertex	Calvaria	Complete	5 × 4
10	M	87	SCC	Vertex	Calvaria	Complete	6 × 6
11	M	81	SCC	Right frontal scalp	Calvaria	Complete	7 × 6
12	M	94	SCC	Vertex	Calvaria	Complete	5 × 5

*Two distinct lesions on the same patient.

MM, malignant melanoma; MMIS, malignant melanoma in situ; SCC, squamous cell carcinoma.

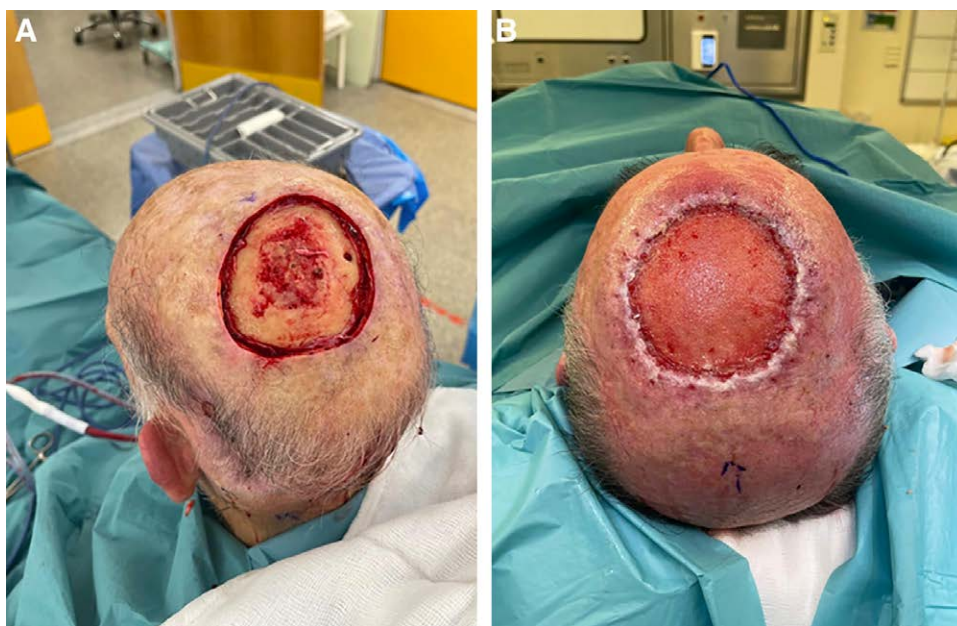


Fig. 1. BTM can facilitate granulation tissue growth even in patients with exposed calvarium. A, Patient 1: post excision with exposed cranium. B, Patient 2: at the second stage, post delamination of BTM.

Records were evaluated for demographics (age and sex), oncological features (tissue diagnosis, stage, grade, margin status following excision, and adjuvant treatment, eg, radiotherapy) and reconstructive outcomes (date of subsequent STSG, STSG take, and wound complications).

Statistical analysis was performed using Microsoft Excel, and median values are presented as median (Q1–Q3).

Surgical Technique and Postoperative Protocol

Following the oncological resection of the skin tumor with appropriate margins, the wound bed would be prepared for the BTM including washout with normal saline (0.9%) and hemostasis. The BTM would then be applied with the outer sealing membrane on the outside and fixed to the surrounding skin with staples. The BTM would then be dressed with Mepitel (Mölnlycke Health Care) and sponge, fixed down with 4/0 Prolene tie-over sutures.

Patients were reviewed weekly in the plastic surgery outpatient dressing clinic, with cleaning of the outer layer of BTM and redressing. They were reviewed by the primary surgeon between weeks 3 and 4, to assess need and/or suitability for subsequent application of STSG.

RESULTS

Between January 2022 and December 2023, 12 patients underwent excision of 13 suspected or confirmed skin cancers with concurrent or delayed reconstruction with BTM. Their demographics are shown in Table 1. All patients were male with a median age of 85 (79–89.5) years. All procedures were carried out under local anesthesia.

Of 13 lesions, 10 were histologically confirmed cutaneous squamous cell carcinoma (one of which was a sarcomatoid type). The remaining 3 lesions were histologically

Table 2. Outcomes of BTM

Patient No.	BTM at Time of Excision (Y/N)	Time to Split Skin Grafting (d)	Skin Graft Take (Y/N)
1*	Y	42	Y
2*	N	51	Y
3*	Y	69	Y
4*	N	52	Y
5	Y	77	Y
6	Y	—	—
7*	N	—	—
8	Y	67	Y
9	N	46	Y
9	N	42	Y
10	Y	45	Y
11	Y	40	Y
12	Y	45	Y

*Patients receiving radiotherapy.

confirmed malignant melanoma (of which 1 was spindle cell type and 1 was desmoplastic type). Of 13 lesions, 10 were excised down to calvaria, 2 lesions were excised with burring of the outer table of the skull, and 1 lesion was excised to pericranium. Of 13 lesions, 11 had excisional margins clear of malignant disease, 1 lesion had micro-metastasis at 1 margin of the excision, and 1 had primary tumor still present at a lateral margin.

Of 13 lesions, 8 (62%) had BTM applied during their primary excisional surgery, and the remaining patients received BTM following failure of STSG at primary surgery. The mean defect size covered with BTM was 32.7 cm². Of 13 lesions, 2 (15%) did not require a second stage resurfacing with STSG, as delamination of BTM revealed a well-healed wound. Of those that went on to receive STSG, the median number of days between first and second stages was 46 (42–67). [Figure 1](#) demonstrates defect preapplication of BTM, compared with the defect after 4 weeks with BTM and subsequent delamination of the outer polyurethane layer ([Table 2](#)). Five patients in the group received concurrent radiotherapy, 4 of these underwent STSG as a second stage procedure, and all had 100% graft take.

CONCLUSIONS

Skin cancer is much more prevalent in the older population,⁸ as reflected in this case series. Local anesthesia is the favored option for both oncological resection and reconstruction in this subset of patients given their myriad of comorbidities and, therefore, suitability for general anesthesia. The subsequent limitation on reconstructive options is further complicated by the resulting wound bed, which in all our patients was the outer table of the skull.

The benefits of BTM are that it is simple to apply, even under local anesthesia, while also developing a wound bed that is suitable for split thickness skin grafting. All our patients who received a 2-stage reconstruction with BTM had complete STSG take and wound healing by day 5 after the second procedure. Interestingly, all patients who had

previously had a failed STSG, had subsequently successful STSG take following BTM use. This case series is limited by only having male patients.

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DISCLOSURES

The authors have no financial interest to declare in relation to the content of this article. Open access fee paid by Polynovo.

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