

Bone wax usage onto combined dorsal auricular areas: Posterior pinna and retroauricular sulcus. A series of six dermatological surgical cases



Clara Jimenez Balcells, MD,^{a,b,c,d} Ines Zarzoso Muñoz, MD,^d Francesca Corella, MD,^d Camila Lodoño Martinez, AN,^d Elisabet Pujantell Cabanas, RN,^d and Emili Masferrer, MD, PhD^{d,e}

Key words: auricular pinna; bone wax; dermatological surgery; dorsal ear; retroauricular area; retroauricular sulcus; skin surgery; secondary intention healing; wound healing.

INTRODUCTION

Dorsal ear tumors may cross multiple anatomical subunits, commonly involving the retroauricular sulcus and the posterior pinna. These carcinomas can produce large skin defects which may need long and complex surgical reconstructions.^{1,2}

There is scarce literature available about the combined reconstruction of dorsal auricular areas. We anticipate that it could be challenging to close these areas due to the limited options available.

In this scenario, opting for second intention healing (SIH) is an appropriate option as it can shorten surgical time, although it may result in a longer wound healing process and the potential for adhesion between the pinna and retroauricular area. Combining bone wax (BW) with SIH may however overcome these obstacles.

Comprised of beeswax, isopropyl palmitate, and a stabilizing agent, BW finds routine application in neurosurgery and dentistry to manage bleeding from bone surfaces during surgical procedures. It is specifically utilized on typical bleeding bone and cartilage areas, particularly where promoting healing without soft tissue attachment is desired. Thanks to its inherent biological and adaptable qualities, BW can be shaped to conform to the contours of the bone surface, creating a specialized and sterile

Abbreviations used:

BCC: basal cell carcinoma
BW: bone wax
SCC: squamous cell carcinoma
SIH: secondary intention healing

microenvironment. This environment minimizes disruption to the underlying granulation tissue, facilitating successful secondary intention healing closure.³⁻⁵ Alternatively, although Vaseline or petrolatum gauze bolster presents an alternative option owing to its convenient application and flexibility, they are not recommended for direct use on skin wounds or incisions due to the discomfort experienced during removal.³ Moreover, the latter is typically combined with other absorbent pressure pads or folded gauze for enhanced effectiveness.

While medical literature has described the use of SIH with BW technique on the medial canthus,³ conchal bowl,⁵ and scalp defects,⁶ we have yet to observe their application to the dorsal ear area.

CASE SERIES

We describe 6 cases of dermatological dorsal ear surgery where wound closure was challenging. In all 6 cases, we found that SIH was the best solution for

From the 4D Skin Clinic, Belmont North, New South Wales, Australia^a; Medical School, The University of Queensland, Brisbane, Queensland, Australia^b; Medical Faculty, Universitat Autònoma de Barcelona, Bellaterra, Catalunya, Spain^c; Dermatology Department, Hospital Mutua de Terrassa, Terrassa, Barcelona, Spain^d; and Medical Faculty, Universitat de Vic-Central de Catalunya, Vic, Barcelona, Spain.^e

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Correspondence to: Clara Jimenez Balcells, MD, 4D Skin Clinic, 364 Pacific Highway, Belmont North, 2280, NSW, Australia. E-mail: clarutxu@yahoo.es.

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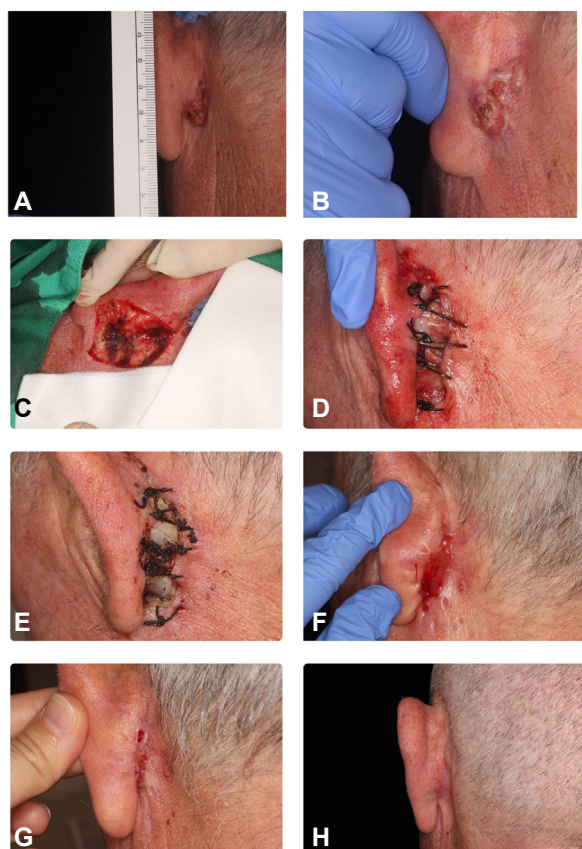


Fig 1. **A**, Location and measured lesion; **(B)** close up lesion; **(C)** surgical defect; **(D)** closed surgical defect with bone wax; **(E)** wound defect at 1 week; **(F)** wound defect at 2 weeks; **(G)** wound defect at 4 weeks; **(H)** wound fully healed at 2 months.

postsurgical wound closure. We applied BW to the combined dorsal auricular areas, including the posterior pinna and the retroauricular sulcus, with positive outcomes and no postsurgery issues.

We present this combination technique and its results through 2 featured cases (Figs 1 and 2) and an overall table that lists age, sex, type of skin cancer, anatomical area, size of the lesion and its surgical defect, cartilage infiltration, and time to closure for all 6 cases with dorsal ear carcinomas (Table I).

Case 1

A 77-year-old Caucasian man had a basal cell carcinoma (BCC) on his dorsal ear that had been biopsy-proven. The BCC measures 3×1.2 cms and had left a defect of 5×2 cms. He was a smoker, diabetic, and had renal insufficiency.

Case 2

A biopsy-proven squamous cell carcinoma (SCC) was found on the dorsal ear of a 76-year-old Caucasian man who has a history of smoking. The

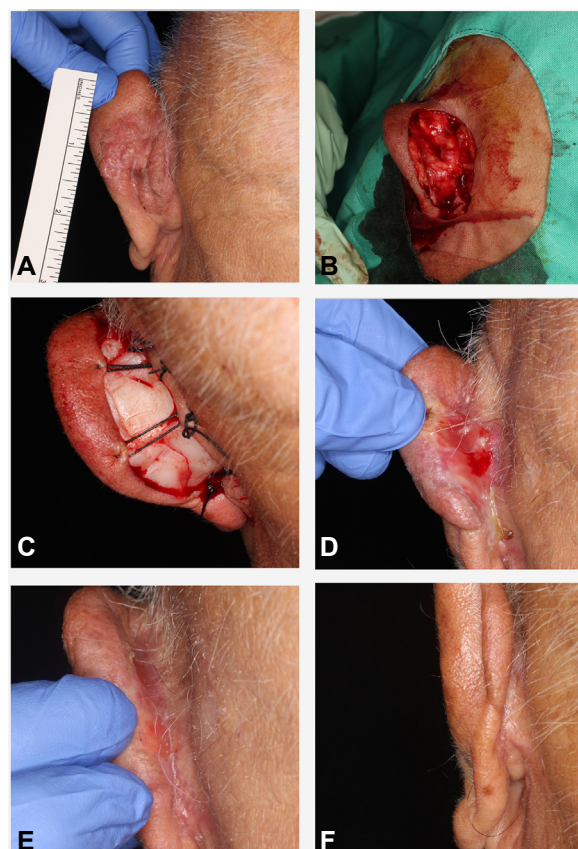


Fig 2. **A**, Location and measured lesion; **(B)** surgical defect; **(C)** closed surgical wound with bone wax; **(D)** wound defect at 1 week; **(E)** wound defect at 2 weeks; **(F)** wound fully closed at 2 months.

size of the SCC was 3.5×2.5 cm and left a defect measuring 4.8×3.3 cms.

The skin was removed down to the periosteum and perichondrium, leaving these intact. Then, the wound edges were brought together with a silk suture to hold BW in place as a sterile dressing.

The wound was covered and kept dry and clean for 1 week. After that, moist wound care began with mupirocine and tulle-type dressing.⁷

Wounds were cleaned with normal saline, leaving BW in place. Healthy granulation tissue was present from week one onward. From week two, sutures and BW could be removed. Moist wound care was continued until the SIH process had finished. By the 5-week mark, most of the cases were fully re-epithelized and closed, except for 2, which took a few days longer.

At a cursory overview, our study involved 6 male patients, all of whom had skin cancer. Four of them had SCC and 2 had BCC on the posterior ear. Four of the patients were smokers, 2 were diabetic, one had renal insufficiency, and 2 had chronic obstructive

Table I. Overall table that lists age, sex, type of skin cancer, anatomical area, size of the lesion and its surgical defect, cartilage infiltration, and time to closure for all 6 cases with dorsal ear carcinomas

	1	2	3	4	5	6
Age	76	77	77	75	95	88
Sex	Male	Male	Male	Male	Male	Male
Type of skin cancer	SCC	SCC	BCC	SCC	SCC	BCC
Area	Dorsal ear (retroauricular sulcus + posterior pinna)	Dorsal ear	Dorsal ear	Posterior pinna	Dorsal ear	Dorsal ear
Size lesion (cm)	3.5 × 2.5	2 × 1	3 × 1.2	2 × 1.3	2 × 2	1.2
Size defect (cm)	4.8 × 3.3	2.5 × 2	5 × 2	3 × 2	3.2 × 3	1.7 × 1.6
Cartilage infiltration	No	Yes	No	No	No	No
Time to confirmed closure	5 wk	4 wk	5 wk and 4 d	5 wk	4 wk	5 wk and 4 d

BCC, Basal cell carcinoma; SCC, squamous cell carcinoma.

pulmonary disease. The mean healing time for the patients was 5 weeks, and the mean defect size was 8.2 cm². There were no complications. All the patients had free margins postsurgical excision except for one, who had cartilage infiltration to margins. Due to his health status, the patient declined further treatment.

DISCUSSION

Skin defects that occur after the removal of post-auricular carcinomas can be challenging to close.

In addition to the conventional full-thickness skin graft, there exist documented variations involving limited types of advancement and/or transposition flaps.^{1,8}

Performing these reconstructions may pose a challenge for dermatological surgeons who are still in the initial stages of their career, as they require a prominent level of skill and finesse. Additionally, these procedures are more time-consuming and may result in 2 wound sites. However, they do offer the advantage of a shorter healing time when compared to SIH.

We concur with Ortiz-Prieto et al⁶ regarding the efficacy of SIH as a rapid and convenient option, offering advantages such as a single wound care site, direct visualization of tumor regrowth, and no need to move adjacent planes.

Throughout the wound healing process, maceration and erythema are common; infection is not. When combining this series^{5,6,9} with other scalp and ear-related studies involving a total of 19 patients where BW was used, only 2 infections by *Staphylococcus aureus* were documented, both of which resolved with oral antibiotics. This particular series did not experience any infections despite not taking antibiotics.

In relation to this specific anatomical site, BW adds the advantage of avoiding attachment to the pinna

and the scalp temporal bone zone. In the context of SIH for surgical defects, BW proves beneficial due to its non-adherent, deformable, and adaptable properties. Serving as an exceptional hemostatic barrier during skin excision, as highlighted by Perandones-Gonzalez et al⁵ and de Nicolas-Ruanes et al¹⁰ facilitates the process of tissue granulation. This enhancement of tissue granulation ultimately promotes skin regeneration and complete re-epithelization.

While there is no objective clinical evidence that BW accelerates SIH, it has been shown in in vitro research.^{11,12} BW exhibits the additional advantages of not causing skin irritation and being applicable directly over bone if deemed necessary.^{7,13}

We should also note the low-cost market price and the simplicity of wound care, which can be done by the patients themselves, avoiding frequent visits to medical practitioners.

Before surgery, it is crucial to assess the patient's overall health status, including their immunosuppression status and any systemic conditions such as diabetes mellitus. Additionally, it is important to consider the patient's social habits, as these factors can negatively impact healing and increase the risk of infection or necrosis. However, based on our experience, patients with complex medical or social histories are often the most suitable candidates for this alternative approach, either as an initial option or as a fallback following failed previous surgical reconstruction.

We demonstrated 6 successful combination closures using BW on SIH, which produced results comparable to other closure techniques such as flaps or grafts.

In summary, BW can be an effective treatment option for surgical wounds in the dorsal auricular area. Combining SIH and BW results in a simple

surgical procedure that is cost-effective, reduces surgery time, and can be performed by all dermatological surgeons. It also avoids complex closures and the associated risks and complications to the patients.

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Conflicts of interest

None disclosed.

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