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Case Report

Successful Management of Post-Excisional Biopsy Dehisced Wound with 1% Framycetin Sulphate and Ozonated Oil Adjuvant

Ferra Olivia Mawu^{1,2*}, O. Reymond L. Sondakh^{1,2}, Joan Alexandra Tampi^{1,2}, Paulus Mario Christopher^{1,2}

¹Department of Dermatology and Venereology, Faculty of Medicine, Universitas Sam Ratulangi, Indonesia

²R. D. Kandou Hospital, North Sulawesi, Indonesia

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Abstract

Background: Wound dehiscence is wound edges separation due to disrupted wound healing. Wound dehiscence is a complication in 8% of dermatologic surgeries. In this case, secondary infection of the wound occurred, 1% framycetin sulphate tulle was selected for its antimicrobial action via inhibition of bacterial protein synthesis, combined with ozonated oil as adjuvant therapy. Ozone oxidizes bacterial phospholipids and lipoproteins, promotes local tissue metabolism, stimulates fibroblast proliferation, facilitates collagen fiber formation, and supports angiogenesis. This case report describes a post-excisional biopsy dehisced wound that was treated with 1% framycetin sulphate tulle and ozonated oil. To our knowledge, this may be the first report of a successful management of post-excisional biopsy dehisced wound with ozonated oil as adjuvant.

Case Presentation: An 11-year-old female was brought with a purulent wound on her head post-excisional biopsy. Examination of the parietal region showed a solitary ulcer, 1 cm in diameter, irregular edge, granulated tissue base, serous exudate, crusting, edema, and pus. Treatment was 0.9% NaCl compress, 1% framycetin sulphate tulle, and ozonated oil once weekly. Evaluation on day 21 showed ulcer size reduction and on day 28, ulcer turned into a scar, treatment was followed by mometasone 0.1% cream. Day 86 showed secondary cicatricial alopecia. Complications of a wound in hair-bearing area can occur, in this case, secondary cicatricial alopecia.

Conclusion: This paper highlights the utilization of ozonated oil as an adjuvant therapy for a favourable outcome in wound healing.

Keywords: hair-bearing area; ozonated oil; tulle; wound dehiscence; case report

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INTRODUCTION

Surgical excision is a surgical technique with a varying risk of complications, one of which is wound dehiscence. Wound dehiscence is defined as partial or complete separation of the wound edges due to failure of optimal wound healing. Several observed risk factors for dehiscence include increasing age, anatomical sites with higher tension, infection, hematoma, smoking, and use of vascular endothelial growth factor inhibitors or oral tyrosine kinase inhibitors. This complication most commonly occurs two weeks post-operative.¹ If wound dehiscence occurs, re-suturing may be reconsidered, if there is no notable infection, hematoma, or necrosis.²

In wounds complicated with secondary infection, topical antibiotic dressing may offer benefits, one of which is the low risk of interference with normal flora.

However, some antibiotics' effectiveness has declined due to the increase of antibiotic resistance across many bacterial strains. This underlies the need for an adjuvant therapy to optimize wound healing, e.g., ozone therapy.³

Ozone therapy was first clinically investigated by Payr and Wolff, where ozone therapy promotes wound healing applied as gas or oil. Continuous research efforts have shown the results that controlled exposure to ozone plays a crucial role in wound healing by reducing the number of bacteria in the wound, creating a favorable environment supporting wound healing.³

*Corresponding author:

E-mail: fomawu@unsrat.ac.id
(Ferra Olivia Mawu)

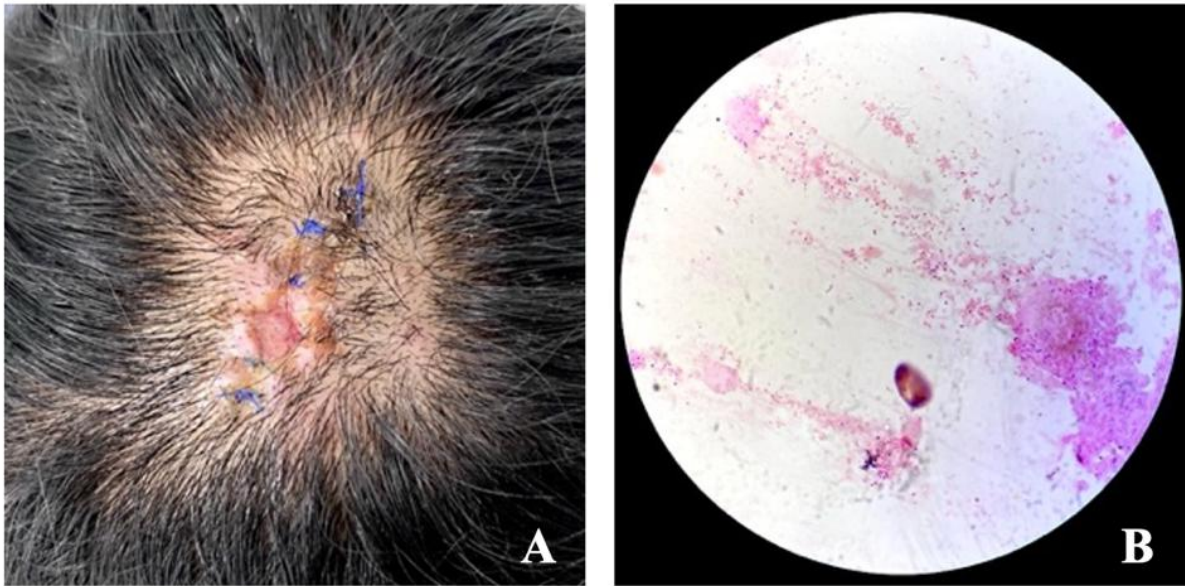


Figure 1. A) Dermatological examination of the parietal region revealed a solitary ulcer with a diameter of 1 cm, irregular edges, covered with granulation tissue, serous exudate, crust, edema, and minimal pus. **B)** Gram examination showing Gram positive cocci

There is a lack of clinical reports evaluating the synergistic effect of topical antibiotics and ozonated oil, particularly in pediatric post-excisional wounds. We present a case report of an 11-year-old female experiencing wound dehiscence after an excisional biopsy due to sebaceous nevus on the scalp treated with 1% tulle framycetin sulphate and ozonated oil. This case offers insight into alternative therapeutic options for wounds with secondary infection on the scalp/ hair-bearing area, amidst growing concerns over antibiotic resistance.

CASE REPORT

An 11-year-old female was consulted at the Department of Dermatology, Venereology, and Aesthetic outpatient department of a tertiary hospital in the North Sulawesi region with a chief complaint of purulent wound on the scalp after excisional biopsy two weeks prior with a notable loose suture, visible clear fluid discharge, and minimal pain in the wound area. The past medical history that may impair wound healing, e.g., diabetes mellitus, hypertension, coagulation disorder, etc., was denied and was not on routine medication. A familial history of delayed wound healing or abnormal coagulation was denied.

On physical examination, the patient appeared *compos mentis*, while vital signs and general physical examinations were within normal limits. No abnormalities were found in the abdominal region. Dermatological examination of the parietal region revealed a solitary ulcer with a diameter of 1 cm, irregular edges, covered with granulation tissue, serous exudate, crust, edema, and minimal pus with a photographic wound assessment tool (PWAT) score of 12 (Figure 1A). Laboratory examination for routine blood tests and coagulation parameters were within normal limits and Gram staining revealed Gram-positive cocci (Figure 1B). No tissue culture was performed. A

diagnosis of post-excisional biopsy ulcer with secondary bacterial infection was established. The patient was prescribed with ibuprofen 200 mg q8hr *per oral* for pain management with optimal resolution, *i.e.*, no pain was reported. Wound care management was initiated with 0.9% normal saline compress, 1% tulle framycetin sulphate, and ozonated oil (Sanoskin® OXY – ozonated olive oil comprising of, *i.e.*, oleic acid [$\pm$ 58%], palmitic acid [$\pm$ 11.8%], linoleic acid [$\pm$ 8%], etc.) applied once weekly. The ozonated oil was applied prior to 1% tulle framycetin sulphate placement and was left in contact for a minimum of two-to-three days.

Upon the seventh day (Figure 2A) and twelfth day (Figure 2B) of follow-up after treatment, there was a significant clinical improvement of the wound; thus, the treatment was continued. On the 21st day of follow-up after treatment, a reduction in wound diameter was observed (Figure 2C). Dermatological examination of the parietal region showed a solitary ulcer with a size of 0.8 cm x 0.7 cm, irregular edges, covered with granulation tissue, serous exudate, and crusts. On the 28th day of follow-up, a complete closure of the wound was achieved, yielding a well-demarcated solitary eutrophic scar with a size of 2 cm x 1.5 cm in size with a PWAT score of 0 (Figure 2D).

Continuous management of ozonated oil was applied once weekly and 0.1% mometasone cream q24hr was prescribed for the scar. On the 86th day of follow-up, hair growth was absent on the scar area even after topical corticosteroids. Dermatological status of the parietal region revealed a well-demarcated solitary eutrophic scar with a size of 2 cm x 1.5 cm (Figure 2E). Trichoscopy examination revealed loss of follicular openings. A diagnosis of secondary cicatricial alopecia was made. Further management of 0.1% mometasone cream q24hr on the scar was continued and intralesional corticosteroid injection was planned.

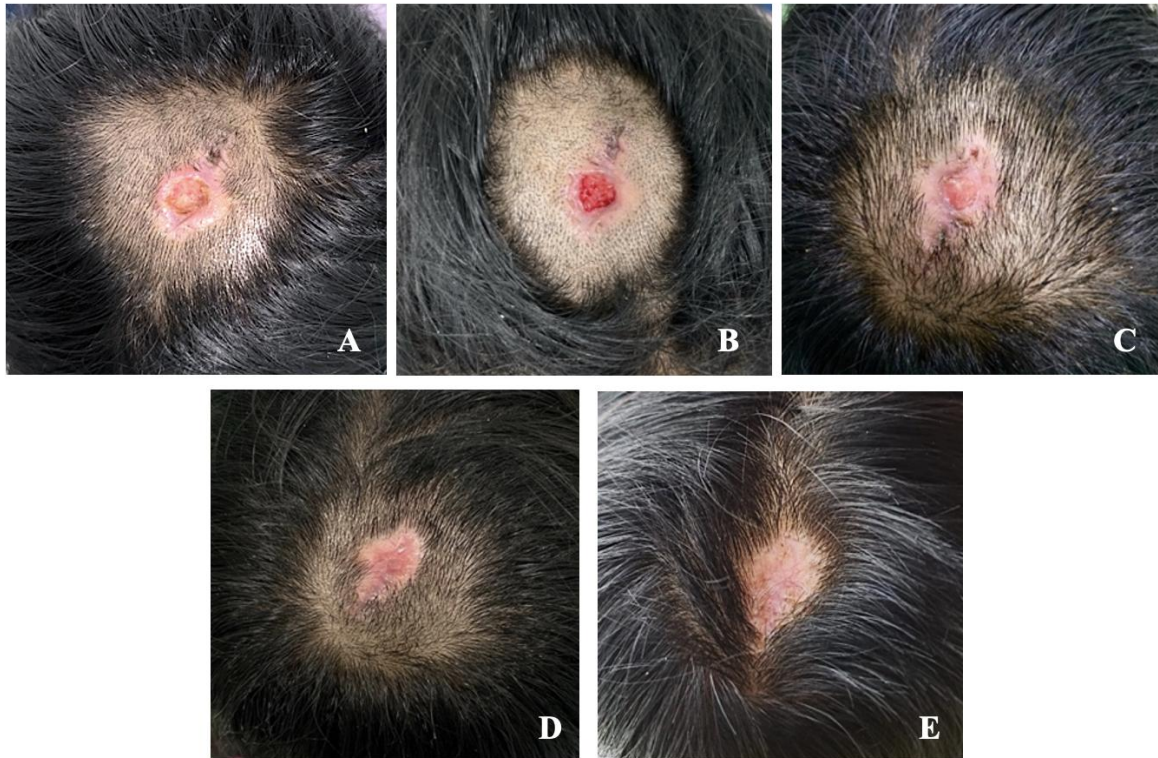


Figure 2. A) Seventh day-, B) twelfth day, C) twenty first day, D) twenty eighth day, and E) eighty sixth day of follow up. Secondary cicatricial alopecia was observed

The patient and the parents were satisfied with the therapy received. The treatment was effective, no notable side effects noted, and the parents' concerns were addressed promptly. Overall, the patient and her parents were grateful for the outcome.

DISCUSSION

Wound dehiscence is estimated to occur in 8% of dermatologic surgery cases.¹ Risk factors for dehiscence include increasing age, high tension sites, mechanical trauma, infection, hematoma, smoking, and use of vascular endothelial growth factor inhibitors or oral tyrosine kinase inhibitors. In the case of wound dehiscence, re-suturing may be performed if there is no contraindication, *e.g.*, infection, hematoma, or necrosis.² In this case, a Gram examination was performed with the result that Gram-positive cocci bacteria were found, so re-suturing was not performed. Initial therapy given was weekly wound care with 0.9% NaCl compress, followed by 1% framycetin sulphate tulle dressing, then ozonated oil application. This wound care was performed.

Wounds with bacterial secondary infection go through five stages: contamination, colonization, local infection, disseminated infection, and systemic infection. As the infection progresses, a protective layer of cells and extracellular matrix called biofilm is formed. Removal of the biofilm may be done by mechanical debridement, the most common of which is applying wet gauze to the wound area and allowing it to dry. With this technique, necrotic tissue or exudate is removed along with the gauze.³

A dressing is a covering applied to a wound. Wound dressings can be divided into three main categories based

on their main mechanism of action, namely passive, interactive, and bioactive. In this case, a non-occlusive passive dressing (tulle) containing 1% framycetin sulphate was chosen to seal the wound from contamination.⁴ Framycetin sulphate belongs to the aminoglycoside class, which has a mechanism of action that interferes with microbial protein synthesis.⁵

In this case, a combination of ozonated oil was added as an adjuvant therapy. Ozone therapy has limitations in the form of toxicity when applied at high concentrations (chronic exposure of 0.7 mg/ day) so that maximum application is only at low concentrations.⁶ Therefore, in the new approach, the combination of antibiotics as ozone as adjuvant therapy is an effective solution without having to rely on high-dose ozone therapy.³ Ozone is recognized as one of the best bactericidal, antiviral, and antifungal.^{7,8} A study by Izadi *et al.* examined the wound healing effect of ozone therapy in 200 diabetic foot ulcer patients aged 18-85 years with the results of complete wound closure compared to the control group.⁹ Research by Haojie Sun *et al.* on diabetic foot ulcers also reported a higher healing rate among ozone therapy group than the control group.¹⁰ Ozone exhibits potent oxidative properties, capable of disrupting bacterial cell membranes by oxidizing phospholipids and lipoproteins. This oxidative action leads to the immediate disruption of microbial structures, including nucleic acids and lysosomes.^{7,8} Additionally, ozone effectively scavenges free radicals, enhances local tissue metabolism, stimulates fibroblast proliferation, promotes collagen fiber formation, and supports angiogenesis, all of which collectively accelerate the wound healing process.^{3,8} Ozone has been used empirically as a clinical therapeutic

agent for psoriasis, atopic dermatitis, warts, athlete's foot, fistulas and postoperative wounds, pressure ulcers, and chronic wounds, *e.g.*, trophic ulcers, ischemic ulcers, diabetic wounds.^{6, 8}

On the 28th day after treatment, the wound appeared to have closed, leaving a well-demarcated solitary eutrophic scar with a size of 2 cm x 1.5 cm in size. Tissue injury triggers a sequential and overlapping series of wound healing events that have been categorized into phases including, (1) coagulation, (2) inflammation phase, (3) proliferation (and migration) phase, and (4) remodeling phase. The coagulation phase occurs immediately after injury, where blood clot formation and activation of intrinsic and extrinsic coagulation cascades occur. The inflammation phase begins with the activation of the classical and alternative complement cascades and subsequent infiltration of neutrophils into the wound site within 24-to-48 hours after injury. The proliferation and migration phase is characterized by fibroblast migration, extracellular matrix deposition, and granulation tissue formation, usually starting around day 3 after injury and lasting 2-4 weeks. The remodeling phase is the longest phase involving continuous collagen synthesis and breakdown as the extracellular matrix develops.¹¹

In this case, the wound had undergone full closure with the combination therapy and no adverse event was reported. Afterwards, the patient was given a topical potent corticosteroid on the scar area, and 0.1% mometasone cream to promote hair growth. Despite the therapeutic efficacy of 1% tulle framycetin sulphate and ozonated oil in promoting optimal wound healing, complications in the hair wound area may still occur. Day 86 post-therapy revealed secondary cicatricial alopecia. For scarring alopecia, the first-line therapy is applying a potent topical corticosteroid (class 3 or 4) on affected areas' borders, extending onto the hair-bearing regions clinically unaffected.^{12, 13} The patient had applied 0.1% mometasone cream as first-line therapy for cicatricial alopecia,¹³ but no hair growth was observed in the scar area, which may occur from hair follicle loss as identified in the trichoscopy finding.^{14, 15} Another alternative for scarring alopecia from trauma and surgical procedures is follicular unit hair transplantation.¹⁶

The prognosis *quo ad vitam* and *functionam* is *ad bonam*, however, *quo ad sanationam* is *dubia ad malam*. In this patient, there was a clinical improvement from ulcer to scar but a complication was present in the form of secondary cicatricial alopecia as it occurred in a hair-bearing area.

CONCLUSION

The use of a combination of 1% framycetin sulphate tulle and ozonated oil as adjuvant therapy is effective in healing wound dehiscence after excisional biopsy accompanied by secondary infection. The combination of the two should be considered in tackling the pathological wound healing process and promoting physiological wound healing. It is noteworthy, that a secondary cicatricial alopecia could occur in a hair-bearing area.

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