



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

Multiple basal cell carcinomas developed after radiation therapy for tinea capitis treated by topical podophyllin solution 25% in Iraqi patient

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Manuscript Info

Manuscript History:

Received: 25 November 2015

Final Accepted: 22 December 2015

Published Online: January 2016

Key words:

Basal Cell Carcinoma (BCC),
Podophyllin, radiation therapy.

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Abstract

Background: Prior to the introduction of griseofulvin in 1960, ⁽³⁾ the world standard for treatment of tinea capitis was scalp irradiation. ^(4,5) Occurrence of BCC following radiotherapy for tinea capitis is well-known, 1-2 Radiation therapy conveys ~4-fold risk to the development of skin cancer in different reports. ^(8,9) Podophyllin is an antimitotic and caustic agent.

Objective: to test the effectiveness of 25% topical podophyllin solution in treatment multiple BCCs developed after radiation therapy.

Methodology and results: 70 year-old farmer male often reported has multiple slowly enlarging crusted lesions on the scalp since 4 years does not heal and that bleeds when traumatized. Patient has a history of radiation exposure for tinea capitis since childhood. These lesions Improve clinically and histological as BCC, treated by 25% topical podophyllin solution weekly for six weeks, All the lesions cured clinically and histological with good cosmetic appearance.

Conclusion: 25% topical podophyllin solution is an effective therapy for these multiple basal cell carcinomas with good cosmetic appearance.

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INTRODUCTION

Radiation used for cancer treatment is called ionizing radiation. The effect of ionizing radiation is due to the lethal damage of the DNA of the cells that rapidly dividing (cancer cells) by the interaction of either photons (X-rays) or electrons lead to mitotic death. This can kill cells or change genes so the cells cannot grow. Ionizing radiation is generally harmful and potentially lethal to living things but can have health benefits in radiation therapy for the treatment of cancer and thyrotoxicosis. Its most common impact is the induction of cancer with a latent period of years or decades after exposure. Some scientists suspect that low doses may have a mild hermetic effect that can improve health.^[1] Radiation-induced cancer, teratogenesis, cognitive decline, and heart disease. Other conditions such as radiation burns, acute radiation syndrome, chronic radiation syndrome, and radiation-induced lung injury, cataracts, infertility, and thyroiditis, meaning they reliably occur above a threshold dose, and their severity increases with dose.^[2] Prior to the introduction of griseofulvin in 1960, ⁽³⁾ the world standard for treatment of tinea capitis was scalp irradiation. ^(4,5) Treatment for tinea capitis was administered using the Adamson-Keinbock technique, which was designed to irradiate the entire scalp as uniformly as possible through exposure to 5 overlapping treatment areas.^[6] A substantial increase in cancer, mental disease, and permanent damage to scalp hair in whom radiotherapy was performed for tinea capitis ⁽⁷⁾. Occurrence of BCC following radiotherapy for tinea capitis is well-known, 1-2 Radiation therapy conveys ~4-fold risk to the development of skin cancer in different reports.^(8,9) Radiation-induced scalp cancer usually arises on established radiodermatitis but may be observed even in normal looking scalp.⁹

Podophyllin:

Podophyllum resin, also known as Podophyllin, is an antimitotic and caustic agent. Natural sources of Podophyllum are the dried resin extracted from the roots and rhizomes of *Podophyllum peltatum* (known as American mandrake, May apple, Ducks' foot, Indian apple) or a related Indian species, *p.hexandrum*; active constituents are lignans including podophyllotoxin (20%), alpha-peltatin (10%), and beta-peltatin (5%)⁽¹⁰⁻¹²⁾. Podophyllum resin (Podophyllin) is the powdered mixture of resins extracted from Podophyllum by percolate with alcohol and subsequent precipitation from the concentrated percolate upon addition to acidified water. Podophyllum is indicated for the treatment of condyloma acuminatum (venereal warts).⁽¹⁰⁻¹⁵⁾

Mechanism of action:

Podophyllum resin's major active constituent, podophyllotoxin, is a lipid-soluble compound that easily crosses cell membranes;

- Potent cytotoxic agents that inhibit cell mitosis and deoxyribonucleic acid (DNA) synthesis.
- It blocks oxidation enzymes in tricarboxylic acid cycle, so it will interfere with nutrition of the cells.
- And it is also inhibits mitochondrial activity and reduction of cytochrome oxidase activity.^(11,12,16,17)

Methodology and results: 70 year-old farmer male often reported has multiple slowly enlarging crusted lesions that does not heal and that bleeds when traumatized. These lesions are seen on the scalp since 4 years. Patient has a history of radiation exposure for tinea capitis since childhood.

On examination 70 year-old patient there are multiple crusted lesions on whole scalp with scarring alopecia bleeding, especially when traumatized, slow growing since 4 years. After Full clinical, and laboratory investigation, Shave or incision biopsies were done for all lesions at the first visit for Histopathological examination, and Serial-section skin biopsies were stained with hematoxylin & eosin. Biopsy showed pigmented basal cell carcinoma.

The patient was fully screened to recording podophyllin side effects through and after treatment by doing the following investigations: liver and, renal function tests, complete blood picture, erythrocyte sedimentation rate, serum electrolytes, fasting blood sugar, serum amylase, general urine examination, Lactic Dehydrogenase (LDH).

Treatment session: treatment sessions are given every week for 6 weeks. The amount used in each session did not exceed 0.5ml. The solution was allowed to dry in approximately 3 minutes and patients were instructed to wash off it after 5 hours. And on each visit the size of the lesion was assessed by marking the lesion and measuring its diameter with a ruler and taking a photo in the same place, light exposure and two dimensions, by using SONY® CORP.MODEL NO.DSC-W220. 12.1 MEGA PIXELS

Biopsy and Histopathological examination were done for all lesions treated and Serial-sectioned skin biopsies were stained with hematoxylin & eosin: (all lesions showed no residual carcinoma cells after six sessions for six weeks).

Follow up: Number of treatment sessions was determined according to the clinical and Histopathological response. Clinical follow up examinations after cure were done every 3 months for up to 18 months, and Patients were also instructed to come back if any suspicious lesion appeared at the site of healing lesion or nearby in order to determine the recurrence rate.

Inflammatory reaction was noted in all treated lesions and this appeared as edema and redness 36-72 hour after application of podophyllin solution with or without pain. This local reaction was more exaggerated after further 3-5 days after podophyllin application as most lesions became ulcerated and some discharge, after that crust formation appearing in all lesions.

Regarding the side effects, no evidence of systemic side effects was found in any of these cases, and this had been confirmed by clinical examination and lab results including blood picture, liver, and renal function tests. Minimal or no scarring was noticed in all lesions.

Discussion: Prior to the introduction of griseofulvin in 1960,⁽³⁾ the world standard for treatment of tinea capitis was scalp irradiation.^(4,5) Occurrence of BCC following radiotherapy for tinea capitis is well-known, 1-2 Radiation therapy conveys ~4-fold risk to the development of skin cancer in different reports.^{8,9} Radiation-induced scalp cancer usually arises on established radiodermatitis but may be observed even in normal looking scalp.⁹ Most BCC cases are sporadic, but it may also appear in genetic disorders such as Goblin's syndrome and XP and radiation.⁽¹⁸⁾ There are many standard therapeutic modalities used in treatment of BCC including surgical excision, curettage with electrodesiccation, cryotherapy, and radiotherapy, Mohs Micrographic Surgery, photodynamic therapy (PDT), laser therapy, intralesional interferon, intralesional zinc sulphate 2%. Moreover topical remedies such as Imiquimod, 5-fluorouracil, tazarotene, also have been used. However many side effects were encountered with this medication. The irradiation used to treat the BCC can cause further damage and carcinogenesis.⁽¹⁹⁾

In **conclusions** 25% topical podophyllin solution is an effective therapy for these multiple basal cell carcinoma without topical or systemic side effects, with rapid recovery and no relapse during follow up and gave very nice cosmetic appearance.



FIG.: 70 years old showing big multiple BCCs on the scalp that followed X-ray radiation



FIG.: the same patient showing full cure after podophyllin application, after 6 sessions.

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