



# **Topical Phenytoin Dressing: A Panacea in Wound Dehiscence Management Due to Implant Exposure after Orthopaedic Surgery: A Case Report**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author TK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SR and VS managed the analyses of the study. Authors BA and LV managed the literature searches. All authors read and approved the final manuscript.*

## **Article Information**

### Editor(s):

(1) Dr. Ikem, Innocent Chiedu, Obafemi Awolowo University, Nigeria.

### Reviewers:

(1) Ato Ampomah Brown, University of Cape Coast, Ghana.

(2) Edmundo Berumen-Nafarrate, University of Monterrey, Mexico.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/58829>

**Case Report**

**Received 01 May 2020**

**Accepted 07 July 2020**

**Published 09 July 2020**

## **ABSTRACT**

Non-healing and wound dehiscence are major healthcare problems in today's orthopaedic surgery. The healing process consists of various sequential events including inflammatory response, regeneration of the epidermis, shrinkage of the wound, finally connective tissue formation and remodeling. Appropriate treatment and wound care promote the healing process, prevent infection and chronicity of the wound. Different methods and approaches have been used to achieve shorter wound healing times. In spite of various efforts the outcomes of existing methods are sub optimal. One of the agent that has been tried in wound healing in Orthopaedics is phenytoin. The phenytoin was introduced for the effective control of convulsive disorders in 1937. An adverse effect of phenytoin is the development gum hyperplasia. This adverse effect of phenytoin of causing apparent connective tissue hyperplasia suggested an exciting possibility for its use in wound healing due to implant exposure after orthopedic surgery. We report a case of panacea effect of topical phenytoin dressing in case of wound dehiscence and exposed implant after orthopaedic surgery.

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**Keywords:** *Diphenylhydantoin; phenytoin; orthopaedic surgery.*

## 1. INTRODUCTION

Wound dehiscence and implant exposures are very common findings after orthopaedic surgery especially after open reduction and internal fixation using plates in superficial bones due to necrosis of overlying soft tissue [1,2]. Repair of tissues involves regeneration (replacement of damaged cells by cells of the same type) or fibrosis (replacement by connective tissue). The healing process consists of various sequential events including inflammatory responses, regeneration of the epidermis, shrinkage of the wound and finally connective tissue formation, and remodeling [3].

These days many research works are performed for manufacturing of topical molecular factors for treatment of wound dehiscence like epidermal growth factors, tissue stimulating factor, vacuum assisted closure and use of hyperbaric oxygen for dressing. The efficacy of such agents is still under study and the cost effectiveness is the major limiting factor. There still remains a quandary for effective wound-healing agents. One such agent is phenytoin which is cheap, convenient and easily obtainable for medical practice. Phenytoin (diphenylhydantoin) was initially used for effective control of convulsive disorders. A common adverse effect with systemic phenytoin treatment is the development of fibrous hyperplasia of gums [4].

Phenytoin has been used by many doctors for wound healing because it promotes the multiplication of fibroblast, increase in production of collagen, increase in local vascularity, enhanced granulation tissue formation, decrease in the action of collagenase and bacterial colonization [5-9]. Phenytoin has antibacterial activity which contributes to removal of *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella* species and *Pseudomonas* [10-12] thereby it enhances the process of natural wound closure.

## 2. CASE REPORT

26 year female presented to orthopaedic outdoor patient department with alleged history of fall from stairs and sustaining an ankle injury. Patient had massive swelling of the ankle and diagnosed as displaced fracture lateral malleolus. Patient was planned for surgery after 10 days of trauma so that swelling settles down. After ten days fracture was fixed with seven hole one third

tubular plate (titanium) (Fig. 1). Then conventional dressing was done on alternate days. The wound was in nearly good condition. But after sixth dressing on 12 post operated day the wound started oozing out serous fluid. And on 20<sup>th</sup> post operated there was skin necrosis, the plate at that point was exposed along with screw heads (Fig. 2).



**Fig. 1. First post operative day X ray of the patient**



**Fig. 2. Wound 20<sup>th</sup> post operative day of fixation of lateral malleolus showing the exposed plate and screw head after which phenytoin dressing was started daily**

Patient was planned for toileting and debridement and implant removal due to fear of flaring up of infection, but after consultation with the consulting surgeon it was decided not to remove the implant, but to do daily dressing using 6ml of topical phenytoin (50 mg/ml). The pus culture was sterile and broad spectrum oral antibiotics were continued. On 26<sup>th</sup> post operative day there appeared blisters just distal to the tip of lateral malleolus which were aspirated (Fig. 3). After 40<sup>th</sup> post operated day the results were favorable as whole of the implant was covered with healthy granulation tissue (Fig. 4). After 55<sup>th</sup> post operative day the

wound was nearly healed (Fig. 5). After 66<sup>th</sup> post operative day the wound was totally healed and patient was allowed to partially weight bear (Fig. 6).



**Fig. 3. n 26<sup>th</sup> post operative day the blisters appeared around hind foot region which were aspirated and phenytoin dressing was continued**



**Fig. 4. Wound after 40<sup>th</sup> post operative day, whole of the implant was covered with granulation tissue**



**Fig. 5. Wound after 55<sup>th</sup> post operative day nearly healed**

### 3. DISCUSSION

Open reduction and internal fixation of fractures using hardware presents a foreign body to human body thus providing good environment for bacterial colonization. The management of wound dehiscence after orthopaedic surgery with exposure of hardware is a major problem following orthopaedic surgery especially in subcutaneous bones [2].



**Fig. 6. Wound on 66<sup>th</sup> post operative day totally healed**

The recommended treatment of choice for wound dehiscence after orthopaedic fracture fixation is to remove the implant. The same was planned in the case mentioned herein. This meant another operative procedure, with debridement of soft tissue, risk of loss of fixation of the fracture leading to poor healing of the fracture [3] and soft tissue. Moreover it leads to additional surgical interventions, all complications of the fracture healing which produce a more difficult rehabilitative path and increase of cost and duration of treatment.

Topical application of phenytoin results in direct access of the drug to the target site and avoids the risk of getting systemic side effects [13]. The findings of the above-mentioned study were taken into consideration for selecting the route of administration of phenytoin for wound healing in the present case. The pus culture was sterile which may be due to broad spectrum oral antibiotics. Patient was explained the prognosis and advised daily antiseptic surgical dressing using 6 ml of phenytoin (50 mg/ml) which was locally available. The results were favorable after ten dressings. There appeared granulation tissue over the plate and screws. No local antibiotics were given but broad spectrum oral antibiotics were continued. The wound was totally healed after eight weeks following surgery. The patient was allowed to partially bear weight. Other options like vacuum assisted closure and another surgery were also there but they are quite costly and increase the duration of hospital stay.

### 4. CONCLUSION

The wound dehiscence and implant exposures are very fearing early post operative complication after orthopaedic fracture fixation using hardware. However, with proper antiseptic surgical dressing using phenytoin may aid in healing of wound, thus avoiding the complication of repeated surgeries. This method is also cost

effective to the patient. Hence proper antiseptic surgical dressing using phenytoin can provide good results in the treatment of wound dehiscence after implant exposure in orthopaedic surgery.

## CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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