

NON HEALING ULCER IN PERIPHERAL ARTERIAL DISEASE: AN OVERVIEW OF PATHOPHYSIOLOGY, RISK FACTORS, TREATMENT OPTIONS

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KEYWORDS

Chronic non-healing ulcer in PAD patients, Aetiological/risk factors for non-healing ulcer in PAD patients. Types of dressings for non-healing ulcers in PAD. Risk reduction strategies for non-healing ulcers in PAD. Management of non-healing ulcer in PAD

ABSTRACT:

Peripheral arterial disease(PAD) is a circulatory condition that affects arteries which leads to decreased blood flow, particularly to lower limbs. Chronic non-healing ulcer is the most common complication that occurs in PAD patients which usually associates with pain, they cause physical, economical and emotional burden to the patient and their family members. Some advances in ulcer management and lifestyle modification are helpful in the management of these ulcers but risk reduction strategies like healthy diet, cessation of smoking, strict lipid control and diabetes control is also an important factors for healing and for future prevention of these ulcers, however the residual risk remains as the PAD is progressive disease.

INTRODUCTION

Historically, the main recommendations for the management of peripheral arterial ulcers have focused on two primary objectives: determining if there is adequate blood flow to heal the wound, and assessing for signs and symptoms of PADⁱ. The prevalence of PAD is 14.9% for those > 45 years of age, and 15–20% for those > 70 yearsⁱⁱ,. The management of the patient with peripheral arterial disease (PAD) has to be planned in the context of the epidemiology of the disease, its natural history and, in particular, the modifiable risk factors for the systemic disease as well as those that predict deterioration of the circulation to the limbⁱⁱⁱ.there are several risk factors which are responsible for PAD and also contributing to hinder the healing process for ulcer in these patients like age, smoking, diabetes mellitus, high cholesterol, sedentary life style, etc.Heavy smokers have a four-fold higher risk of developing IC compared with non-smokers. Smoking cessation is associated with a decline in the incidence of IC. Results from the Edinburgh Artery Study found that the relative risk of IC was 3.7 in smokers compared with 3.0 in ex-smokers (who had discontinued smoking for less than 5 years).^{iv}

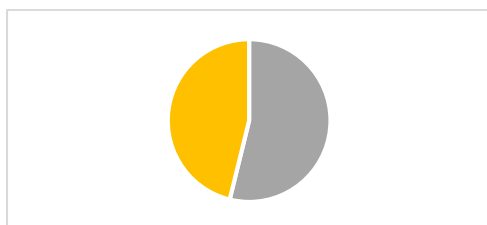
Arterial insufficiency inhibits the wound healing process as tissues are poorly perfused and the delivery of systemic antimicrobials is often compromised as a result of the lack of blood supply to the wound site^v. Topical oxygen therapy is the one of the recent management option used in patients with non-healing ulcer in PAD patients for ulcer healing^{vi}. Patients diagnosed with both PAD and DM have been shown to be seven to 15 times more likely to experience major amputation following the development of an ulcer, as compared with those without DM^{vii}.Currently, the diagnostic tests used to screen for and confirm PAD/LEAD include:

ankle-brachial pressure index (ABPI), toe brachial pressure index (TBPI), duplex ultra sound (DUS), pulse volume recording (PVR), transcutaneous oxygen tension (TcPO₂), continuous-wave and leg segmental pressure measurements, computed tomography angiography (CTA), magnetic resonance angiography (MRA) and conventional angi ography.^{4,9,58} Some of these investigative methods can also provide valuable information regarding the location, characteristics and severity of occlusive lesions in arterial vessels. The optimal approach to the prevention and management of arterial ulcers is to treat the underlying disease and to avoid infection to the wound^{viii} . this is not always possible, considering that 50% of patients with PAD are asymptomatic, it remains undetected^{ix}

Materials and Methods: Diagnostic and outcome analysis was performed for 100 patients with chronic non-healing ulcer who are with PAD. Thorough history regarding patients clinical history, life style, patient diet history and habits were taken and various types of wound dressing methods^x are also assessed following investigations like complete blood picture, serum albumin levels, lipid profile, arterial doppler within a period of 3years.

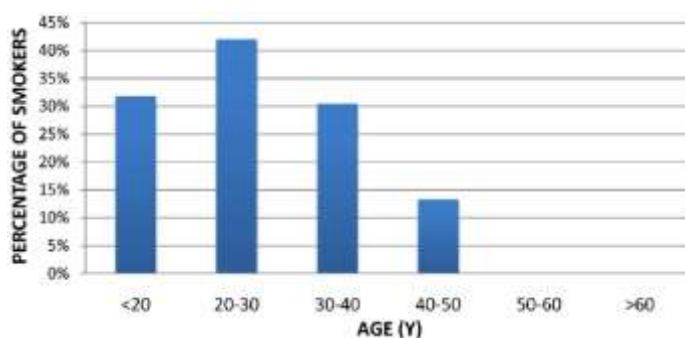
Results and Discussion:

A)**Age:** greater than 60 years are most likely to be affected.



>60 years	65%
<40years	26%

B)**Smoking** : most common risk factor that has a strong association with peripheral arterial disease. Damages the blood vessel and accelerates the progression of atherosclerosis.



Chronic smoking history for >15 years	58%
Smoking history	68%

C)**Diabetes:** increases the risk of peripheral arterial disease development and impairs wound development.

D)**Hypertension:** can damage the arteries and leads to development of peripheral arterial disease.

E)**High cholesterol:** formation of fatty plaques in the arteries results in decreased blood flow and high risk of ulcers.

Abnormal lipid profile with normal dietary habits	57%
Sedentary lifestyle	26%

F)others factors -obesity,sedentarylifestyle,H/o CVS diseases.

Treatment :

1) To improve blood flow to the affected area.

- **CILOSTAZOLE** -should be started in all patients with peripheral arterial diseases as it inhibits the platelet aggregation and improves the endothelial function by maintaining arterial patency related outcomes.

2) Treating the risk factors and co-morbidities:

Maintaining a healthy lifestyle plays a major pivot role in healing of ulcers in peripheral arterial diseases.

- Improving the nutritional status and physical activity.
- Cessation of smoking are the most important factors

3)Wound Care :mainly consists of

1. Debridment:can be surgical or non surgical

- Done in cases more of exudation and infective ulceration for better outcome and better healing.
- Specimen /swab sent for culture and sensitivity and early antibiotic prophylaxis is started.

2. specialised wound dressings:

- **Vacuum assisted closure dressings** :gives us a wonderful outcome reduces excessive secretions ,decreases the oedema and promotes healing .
- **Dry wound** :can be addressed with occlusive dressings along with megaheal dressings .
- **Wet wound**: moist wound contributes to healing environment but exudative wound with copious fluid can be detrimental to healing.
- **Other dressings** -hydrocolloids can be used for mild exudates
Foam dressings -mild to moderate exudates.

3. Topical applications:

Topical applications of growth factors like platelet derived growth factors,vascular endothelial growth factor, transforming growth factor,

Platelet rich plasma can stimulate the cell proliferation and tissue regeneration of wound.

4.Lifestyle changes: quit smoking, healthy nutrition, regular physical activities.

5.Revascularisation.

6.Amputation -in severe life threatening situation .

PAIN:

Pain Is common in patients with arterial ulcer but undertreated in this patients and most of the population .

Pain can be NOCICEPTIVE AND NEUROPATHIC OR MIXED TYPE.

- Nociceptive pain – can be sharp ,shooting and aching type of pain.
- Neuropathic pain-burning, tingling, pins and needles type of sensation.
Can be treated with gabapentins ,tricyclic antidepressants ,selective serotonin inhibitors .

CONCLUSION

Pad is a circulatory condition that affects arteries caused by reduced blood flow chronic non healing ulcer is the most common complication that occurs in PAD. maintaining good healthy lifestyle with caessation of smoking ,good physical activity, Earlier intervention with proper workup helps in good outcome of the patient.Early treatment and proper education about the pros and cons of ulcer healing in pad patients will give utmost benefit to them.

ETHICS approval and consent to participate

List of abbreviations

Pad -peripheral arterial disease; **Vac- therapy**vacuum assisted closure wound;**DM**-diabetes mellitus ;**HTN**-hypertension;**PRP**-platelet rich plasma;

Data Availability

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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Supplementary Materials

No materials attached here

REFERENCES

1. Sibbald RG, Goodman L, Woo K, Krasner DL, Smart H, Tariq G, et al. Special considerations in wound bed preparation 2011: An update. *Adv Skin Wound*. 2011;24(9):415–436.
2. Andras A, Ferket B. Screening for peripheral arterial disease (Review). *Cochrane Database Syst Rev*. 2014;(4):1–17.
3. Norgren L, Hiatt WR, Dormandy JA, Nehler MR, Harris HA, Fowkes FGR. Inter-Society consensus for the management of peripheral arterial disease (TASC II). *J Vasc Surg*. 2007;45(Suppl S):S5–S67.
4. Fowkes FG, Housley E, Cawood EH, Macintyre CC, Ruckley CV, Prescott RJ. Edinburgh Artery Study: prevalence of asymptomatic and symptomatic peripheral arterial disease in the general population. *Int J Epidemiol* 1991;20(2):384-92.
5. Frykberg RG, Zgonis T, Armstrong DG, Driver VR, Giurini JM, Kravitz SR, et al. Diabetic foot disorders. A clinical practice guideline (2006 revision). *J Foot Ankle Surg*. 2006;45(Suppl 5):S1–S66.
6. Gottrup F. Oxygen in wound healing and infection. *World J Surg*. 2004;28(3):312–315.
7. Rooke TW, Misra S, Beckman JA, Gornik HL, Jaff MR, Olin JW, et al. ACCF/AHA focused update of the guideline for the management of patients with peripheral artery disease (updating the 2005 guideline). *Circulation*. 2011;124(18):2020–2045.
8. Hopf HW, Ueno C, Aslam R, Dardik A, Fife C, Grant L, et al. Guidelines for the prevention of lower extremity arterial ulcers. *Wound Repair Regen*. 2008;16(2):175–188.
9. Norgren L, Hiatt WR, Dormandy JA, Nehler MR, Harris HA, Fowkes FGR. Inter-Society consensus for the management of peripheral arterial disease (TASC II). *J Vasc Surg*. 2007;45(Suppl S):S5–S67.