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RESEARCH ARTICLE

TO PREDICT THE NEED FOR AMPUTATION IN DIABETIC FOOT ULCER USING SVS – WIfI SCORING SYSTEM

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Abstract

Analysis of svs wifi scoring – as a predictor for amputation in diabetic foot ulcer dr. Shibani chandiramani, dr lisha suraj department of general surgery mahatma gandhi medical college, navi mumbai **introduction** : Critical limb ishchemia in diabetic patients is defined as a clinical syndrome of ischemic pain at rest and/or ischemic tissue loss such as non healing ulcers or gangrene for more than 2 weeks with ankle pressure of < 40mmhg. It differs from acute limb ischemia which is sudden loss of perfusion typically due to embolus or in situ thrombus. The svs wifi scoring system stratifies cli on the basis of perfusion , extent of wound and superadded infection to provide a composite score wich guides further management and predicts final prognosis.

Aim:- to predict the need for amputation in diabetic foot ulcer using svs wifi scoring.

Objectives:- To study the predictive role of svs wifi scoring system in diabetic foot ulcers undergoing amputation material and methods :- the subjects were 30 patients with diabetic foot ulcers, gangrene, wound presenting to general surgery, diabetic clinic or vascular surgery at mgm medical college , navi mumbai. Wifi scring of diabetic foot ulcers were done at the time of presentation after obtaining consent from the patient/ relatives.the wifi categories according to risk of limb loss were identified with endpoint being major/ minor amputations.

Result:- The composite wifi score (a summmation of wound , infection and ischemia sub-scores) was a good predictor of need for amputation in diabetic ulcer patients.

Introduction:-

India has a population of almost 65 million individuals who have received a diagnosis of diabetes mellitus, and the prevalence of this illness is quickly reaching epidemic proportions in the nation. The disease-related complications hinder the quality of life.[1]

Foot ulcers and their associated consequences significantly contribute to the morbidity and death rates among diabetes patients. Diabetes is prevalent in over 50% of people having nontraumatic lower limb amputations. Diabetic foot ulcers result in reduced mobility, impairing patients' capacity to carry out basic daily duties and engage in

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recreational pursuits. The death rate among these individuals after amputation is substantial, ranging from 39% to 80% during a 5-year period.[2]

Classification systems are very valuable tools for medical practitioners for managing patients with at-risk limbs. The capacity to classify and separate a diverse population into highly detailed subgroups not only facilitates effective communication among providers, but also enables a more precise evaluation of results across different treatment approaches. However, traditional categorization schemes are inadequate in fully encompassing the range of diseases affecting at-risk limbs.

The Fontaine and Rutherford classifications, widely used for evaluating compromised limbs and peripheral arterial disease (PAD), only represent ischemic models. Infection is not included by either categorization, nor does it provide enough specificity about the severity of the wound.[1,3]

The Lower Extremity Threatened Limb (Wound Ischemia foot Infection [WIfI]) Classification System was recently developed by the Society for Vascular Surgery (SVS) Lower Extremity Guidelines Committee. The SVS WIfI classification system was created by merging the existing CLI and diabetic foot ulcer (DFU) classification methodologies. The classification method predicts the likelihood of limb amputation by considering three graded factors: characteristics of the ulcer/wound, the extent of blood flow to the foot, and the severity of infection.

The Society for Vascular Surgery WIfI technique is intended for patients who have a diabetic foot ulcer, a foot ulcer that has not healed for two or more weeks, or ischemia rest pain. Therefore, the objective of the study was to forecast the likelihood of amputation in patients with diabetic foot ulcers by using the SVS WIfI scoring system

Material & Methods:-

The present study was conducted in the Department of General Surgery, Mahatma Gandhi Medical College, Navi Mumbai from July to December 2023. Total 30 patients with diabetic foot ulcers, wound presenting to general surgery were recruited after obtaining consent from the patient/ relatives.The wifi categories according to risk of limb loss were identified with endpoint being major/ minor amputations.

Patients with diabetic foot ulcers admitted under department of General surgery were recruited in this study. Information proformas were provided to the patient and they were consented after explaining the intention of the study and their role in the study.

The patients who consented for this study underwent evaluation by SVS-WIfI scoring system and their standard laboratory investigations were noted. Clinical proforma form was filled and appropriate WIfI score for the patient was calculated.

The assessment of each component is based on a continuum ranging from 0 (no presence) to 1 (slight presence) to 2 (moderate presence) to 3 (significant presence).

These grades are used to determine the allocated class for a WIFI. Each class is categorised into a certain stage:
Stage 1: Amputation risk is very low.
Stage 2: Amputation risk is low.
Stage 3: Moderate danger of amputation.
Stage 4: High danger of amputation.
Stage 5: Irreparable foot,[5]

Patients were grouped according to their WIfI score into GROUP 1 [stages 1-3] and GROUP 2 [stage 4&5].

Inclusion Criteria:
Patients with diabetic foot ulcers

Exclusion criteria:
1. Vulnerable age groups [Age <15,>70]
2. pregnant women
3. Stump ulcers
4. Patients who did not consent

Staging :
Wound was examined and depth of the wound and presence and extent of gangrene was noted.
Ischemia component of the lower limb was scored from the ABPI values and Toe pressure values.

Foot infection component of the score was calculated from clinical assessment of presence of local signs of inflammation and presence of systemic signs of infection.

Table 1:- The WIfI classification for threatened lower limbs: assessment of risk of amputation.

Component	Grade	Description		
Wound(**W**)	**0** **1** **2** **3**	Noulcerorgangrene(ischemicpainatrest) Smallorsuperficialulceronlegorfoot,withoutgangrene(SDAorSC) Deepulcerwithexposedbone,joint,ortendon±gangrenelimitedtodigits(MADorstandardTMA±SC) Deep,extensiveulcerinvolvingforefootand/ormidfoot±calcanealinvolvement±extensivegangrene(CRofthefootornontraditionalTMA)		
Ischemia(**I**)		**ABI**	**SBPoftheankle**	**TP,TcPO$_2$**
	0	≥0.80	>100mmHg	≥60mmHg
	1	0.6-0.79	70-100mmHg	40-59mmHg
	2	0.4-0.59	50-70mmHg	30-39mmHg
	3	≤0.39	<50mmHg	<30mmHg
footInfection(**fI**)	**0**	Uninfected		
	1	Mildlocalinfection,involvingonlytheskinandsubcutaneoustissue,erythema>0.5to≤2cmModerate localinfection, witherythema >2cm orinvolving deeperstructures		
	2			
	3	SeverelocalinfectionwithsignsofSIRS		

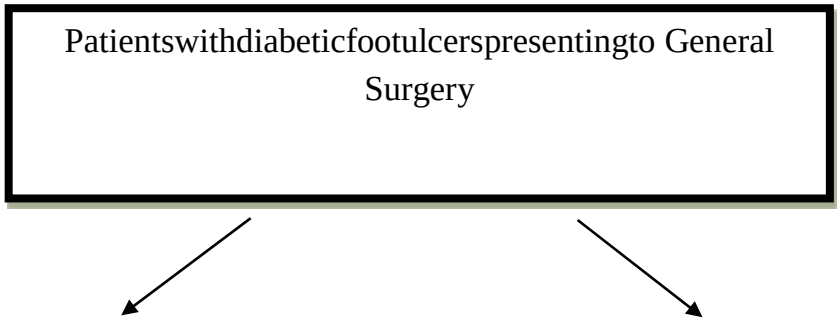
WIfI score, thus calculated was used to group patients into GROUP 1 and 2.

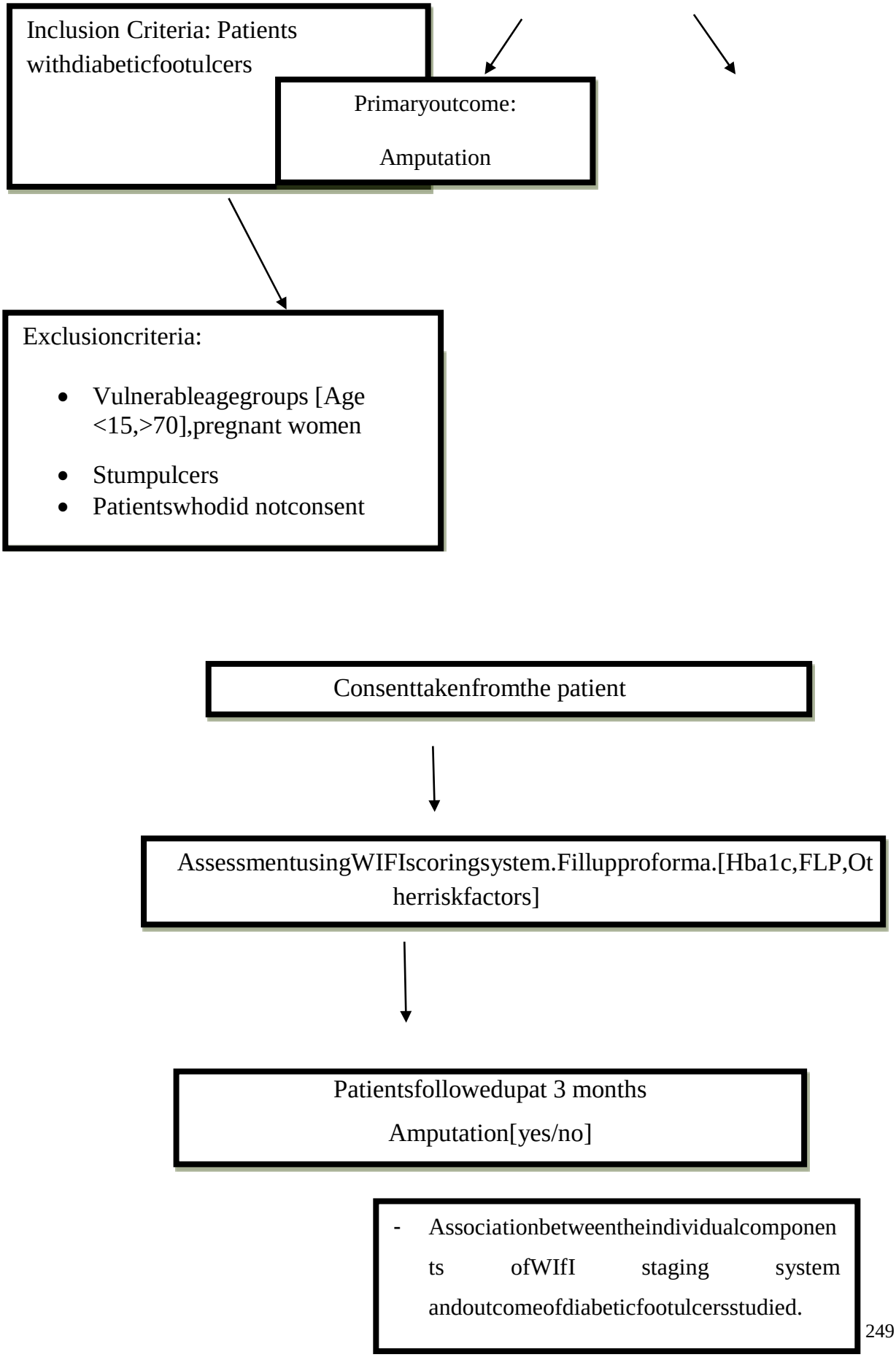
Stages 1-3 were grouped under group 1 and stage 4 was considered group 2.

Routine blood investigations were noted. Glycaemic control was assessed by HbA1c values and all treated patients were maintained under glycemic control

Follow Up
Patients were followed up through telephone or by analyzing outpatient follow up charts at 3 months from recruitment. Patients' outpatient charts were analyzed for follow up if patient was regular on follow up.

Algorithmofthestudy




Inclusion Criteria: Patients withdiabeticfootulcers
Primaryoutcome:
Amputation
Exclusioncriteria:
Vulnerableagegroups [Age <15,>70],pregnant women
Stumpulcers
Patientswhodid notconsent
Consenttakenfromthe patient
AssessmentusingWIFIscoringsystem.Fillupproforma.[Hba1c,FLP,Otherriskfactors]
Patientsfollowedupat 3 months
Amputation[yes/no]
- Associationbetweentheindividualcomponents ofWIfI staging system andoutcomeofdiabeticfootulcersstudied.

Results:-

Table 2:- Amputation status.

Variables		Group 1 STAGE (1-3)	Group 2 STAGE (4 &5)
Amputation	Not done	4	2
	Done	6	18

Out of 30 patients, In group 1 and group 2, 6 and 18 patients had amputation.

Table 3:- Wound grade.

	Wound0	Wound1	Wound2	Wound3
Noamputation	0	4	2	0
Minoramputation	0	2	12	1
Majoramputation	0	2	2	5
Total	0	8	16	6

Among 30 patients involved in the study, 8 patients had wound grading of 1, 16 patients had wound grading of 2 and 6 patients had wound grading of 3.

Table 4:- Ischemia grade.

	Ischemia0	Ischemia1	Ischemia2	Ischemia3
Noamputation	4	1	1	0
Minoramputation	8	3	1	1
Majoramputation	6	2	1	2
Total	18	6	3	3

Among 30 patients involved in the study, 18 patients had ischemia grading of 0, 6 patients had ischemia grading of 1, 3 patients had ischemia grading of 2 and 3 patients had ischemia grading of 3.

Table 5:- Foot Infection.

	Infection0	Infection1	Infection2	Infection3
Noamputation	2	2	1	1
Minoramputation	4	2	5	7
Majoramputation	0	2	1	4
Total	5	6	7	12

Among 30 patients involved in the study, 5 patients had infection grading of 0, 6 patients had infection grading of 1, 7 patients had infection grading of 2 and 12 patients had infection grading of 3.

	Ischemia0					Ischemia1				Ischemia2				Ischemia3		
Wound0	VL	VL	L	M	VL	L	M	H	L	L	M	H	L	M	M	H
Wound1	VL	VL	L	M	VL	L	M	H	L	M	H	H	M	M	H	H
Wound2	L	L	M	H	M	M	H	H	M	H	H	H	H	H	H	H
Wound3	M	M	H	H	H	H	H	H	H	H	H	H	H	H	H	H
	fI0	fI1	fI2	fI3	fI0	fI1	fI2	fI3	fI0	fI1	fI2	fI3	fI0	fI1	fI2	fI3

VL=verylow;L=low;M=moderate;H=high;fI=footinfection;WIfI=Wound,Ischemia,andfootInfection.

Table 6:- Estimation of risk of amputation, according to WIfI classification clinical stages.

Discussion:-

Diabetic foot ulcers are one of the common complications of diabetes mellitus and its related micro and macrovascular effects.

The purpose of undertaking this study is to validate the SVS-WIfI scoring developed by the society of vascular surgery in order to establish a scoring system which included all three major factors that predict amputation.

Crucially, disputes over amputation cannot be settled without a more accurate categorization of the individual's undergoing treatment.[8-10]Studies have suggested that SVS-WIfI scoring has good amputation prediction effects and wound healing time prediction. In this study, we were evaluating the amputation prection accuracy of WIfI scoring system.

Since the original publication by Mills et al.[11] several important studies have been published that aimed to test and validate the SVS WIfI classification system (Table 1). Below, we present the most important studies published till date that discuss validation of the system and describe its advantages, limitations, and challenges for the future.

In 2014, Cull et al[13] examined and graded 139 foot wound patients undergoing any lower extremity revascularization and concluded that increases in the WIfI clinical stages correlate with poorer wound healing and lower rates of 1-year limb salvage.

Similarly, in 2015, Zhan et al[12] evaluated 201 patients with threatened limbs undergoing any lower extremity revascularization, illustrating that an increases in the WIfI clinical stage increases the risk of 1-year amputation, decreases 1-year amputation-free survival, and prolongs wound healing.

In 2016, Beropoulis et al[13] further validated the WIfI classification system in a prospective study of 302 CLTI patients undergoing endovascular treatment, finding statistical differences in 1-year amputation.

Recently, a group of researchers from Johns Hopkins Hospital conducted a retrospective analysis of 217 patients with 279 limbs affected by DFU who were seen at their multidisciplinary clinic from 2012 to 2015 and found that the incidence of major amputation at 12 months was similar across WIfI classification stages.

Our data both expand and corroborate these claims, validating the WIfI classification system for amputation in diabetic foot ulcer

The main aim of the research was to assess the predictive capacity of the SVS-WIfI scoring system in determining the likelihood of amputation in individuals with diabetic foot ulcers. Patients were monitored after being enrolled, and the results were recorded.

The analysis of amputation rates in different stages of group 1 reveals a correlation between the stage of the disease and the likelihood of amputations, with a higher frequency seen in individuals at more advanced stages.

When the WIfI scoring system was analysed by breaking it down into its separate components, it was seen that as the severity of wound features, ischemia, and foot infection increased, there was a corresponding rise in the occurrence of amputations. No individuals received a wound score of 0, since the research exclusively included patients with foot ulcers. The infection grading demonstrated a rise in the occurrence of amputation in both grade 2 and grade 3 cases. This aligns with the findings in the literature, particularly in the context of severe amputations.[11,12]

Conclusion:-

In the period of six months during which the study was carried out, the SVS WIfI scoring system was able to predict the occurrence of major amputations in individuals who previously had diabetic foot ulcers.

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