

Triple assessment for addressing trio-pathy in diabetic foot – Rapid screening tool for amputation prevention in govt. Hospital setting

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Abstract

Introduction: The present study was done to perform foot examination using Amit Jain's Triple Assessment screening tool on in-patients in surgical wards.

Materials and Methods: A descriptive retrospective study was done at Gajra Raja Medical College, Gwalior (M.P.) in department of surgery during a period from April 2018 to June 2018 on patients of diabetic foot admitted in all six units of surgical wards.

Results: A total of 72 patients were included in this study as per search in case records. Majority of patients had diabetes of more than ten years duration and males were more commonly affected. All patients had diagnosis of diabetic foot with varied spectrum of associated lesions alone or in combination. Surgical debridement (66.66%) was the commonest procedure done in these patients. The affected foot of all patients was examined, with component assessment of feeling pedal pulses done in 86.11% cases and testing for sensation was done in 25% cases. In contralateral foot 58% patients were examined, in similar percentage pedal pulses were examined and foot sensations were not tested in any of them.

Conclusion: Despite foot examination being of paramount importance it is often incomplete and inadequate in diabetic foot subjects as is also evident from observations of present study. Amit Jain's Triple assessment of diabetic feet is a rapid inexpensive screening tool for obtaining basic foot information in order to segregate at risk feet and offer preventive care against amputation.

Keywords: Amit Jain, Assessment, Triple, Diabetic foot, Trio-pathy, Screening, High risk foot.

Introduction

Diabetes mellitus is the most common metabolic disease of twenty first century which has registered growth in epidemic proportions affecting around 366 million people across the globe.¹ One of the most devastating complications of diabetes are those involving feet, which commence with onset of loss of protective sensation or diabetic neuropathy. In 80% of diabetic patients with trophic ulcers there is lack of protective sensation. In diabetic neuropathic subjects the risk of developing foot ulcer almost doubles to 4.5% compared to only 2% risk in a diabetic without neuropathy.

Presence of diabetes related trio-pathy of neuropathy (peripheral and autonomic), vasculopathy, immunopathy with infection predisposes to ulceration and eventually amputation.² It is well known fact that a diabetic individual has 15-25% life time chance of developing foot ulcer of which more than half get infected and 50-70% recur over ensuing five years.³ Approximately 85% cases of non traumatic lower limb amputation have a history of diabetic foot ulceration as the presence of diabetes is associated with 20 fold higher risk of lower extremity loss. Diabetic foot ulcer undergoing amputation is linked to about 50% mortality rate, which is twice that in a person without diabetic foot ulcer; and even worse prognosis than breast or prostate cancer.⁴

The treatment of foot ulcers and related amputations may be economically draining to the diabetic patients due to direct treatment costs and

indirect costs in terms of loss of work productivity.⁵ Recent years have witnessed a sharp decline in number of major amputation in diabetic patients owing to excellent preventive education, screening programmes and targeted therapy at diabetic foot speciality clinic. The preventive programmes focus on screening of high risk foot due to diabetic neuropathy, which is the earliest identifiable point in amputation cascade.

Routine complete foot evaluation by a clinician or paramedical staff may be incomplete or even missed in 80% of cases owing to lack of time or inadequate training.⁶ It is essential to perform comprehensive foot workup in order to reduce foot related problems in diabetic patients.

In-Low's 60 second diabetic foot screening,⁷ simplified 60 second diabetic foot screening⁸ and Amit Jain's Triple assessment⁹ for diabetic foot are few comprehensive screening tools specifically for diabetic foot.

The aim of conducting present study was two fold – firstly to evaluate adequacy of foot examination done in surgical inpatients by treating surgeons according to Amit Jain's triple assessment – look, feel and test component tools and secondly to establish the efficacy of this new screening tool. Amit Jain's triple assessment is a rapid, simplified novel screening method for diabetic foot from Asian continent for early recognition of diabetic foot trio-pathy and check progression of high risk feet to amputation. This screening method fulfills most criteria laid down for ideal screening test, is simple, very practical,

acceptable, cost effective and endowed with repeatability in hands of different health care professionals from different regions.

Materials and Methods

A descriptive retrospective study was done in Department of surgery at Gajra Raja Medical College, Gwalior (M.P.) India for a period from April 2018 to June 2018. Data were collected from central admission register and case records of each surgical unit. The inclusion and exclusion criteria for our study were as follows:

Inclusion Criteria

1. Diabetic foot patients with type 2 DM admitted in all six units of general surgery wards of our hospital.
2. Referred cases of diabetic foot in our hospital operated else where.

Exclusion Criteria

1. Patients with type 1 diabetes.
2. Diabetic foot patients admitted in medical wards, ICU or in other departments.
3. Diabetic foot patients who died during treatment or referred to other wards
4. Patients in whom records were not available.

We did evaluation of diabetic feet using Amit Jains Triple assessment and studied the three components of look, feel and test in our study. Identification of ulcer, infection or preulcer callus or scar by inspection of dorsum of foot, sole and interdigital spaces was done for look component of screening. For feel component palpation of dorsalis pedis, anterior tibial artery and posterior tibial artery was done with aim to detect ischemia. For Test component we utilized monofilament test and/or tuning fork to assess touch and vibration sensation respectively. We analysed the data obtained using mean and percentage values. This study was approved by our institution ethics committee.

Results

A total of 70 consecutive subjects who were admitted to all six units of surgical wards were recruited for this study. There were 49 males (68%) and 23 females (32%). Fig. 1

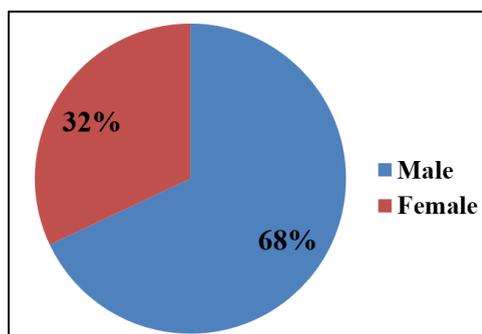


Fig. 1: Gender distribution of subjects

Out of the total patients majority 29 (40.27%) were in age group 41-50 years. Only 07 (9.72%) patients were less than 40 years old and 10 (13.88%) above 60 years age. (Table 1)

Table 1: Age group of patient in the study

Age in years	No. of patient	Percentage
<40	7	9.72
41-50	29	40.27
51-60	26	36.11
61-70	10	13.88
Total	72	100%

The right foot was involved in 43 (59.72%) patients, 27 (37.5%) patients had left foot involved and only 2 (2.77%) patients had bilateral involvement. (Table 2)

Table 2: Affected side of subjects studied

Side	No. of Patients	%
Right	43	59.72
Left	27	37.5
Bilateral	2	2.47
Total	72	100

In 37 (51.38%) cases the duration of diabetes was not mentioned in the case records. The duration of diabetes in most cases 23 (31.94%) was of 10-20 years duration. (Table 3)

Table 3: Duration of diabetes

Duration	Number of patients	%
Not mentioned	37	51.38
< 10 years	11	15.27
> 10 years	24	33.33
Total	72	100

We searched for diabetic foot cases in all six units of surgical wards and following table 4 shows unit wise case distribution.

Table 4: Unit wise case distribution of diabetic foot subjects

Unit	No. of cases
Unit I	18 cases
Unit II	9 cases
Unit III	8 cases
Unit IV	10 cases
Unit V	12 cases
Unit VI	15 cases
Total	72 cases

All the case records showed diagnosis of diabetic foot in addition to associated varied spectrum of lesions such as ulcer, abscess, cellulitis, osteomyelitis, necrotising fasciitis, wet/dry gangrene, peripheral

arterial disease, charcot neuro arthropathy etc. in various combinations.

Debridement was the commonest surgical procedure done in 48 cases (66.66%) followed by toe/toes amputation done in 10 cases (13.88%). A total of 8.33% patients underwent major amputation (below knee amputation + above knee amputation). The overall amputation (minor and major) accounted for 55.55% cases. (Table 5)

Table 5: Surgical procedures done on diabetic foot patients

Surgery	No. of patients	%
Debridement	48	66.66
Toe/ toes amputation	10	13.88
TMT	5	6.94
Mid foot amputation	3	4.16
BKA	4	5.55
AKA	2	2.77
Total	72	100

Affected side (ipsilateral) foot was examined in all patients (100%). Evaluation of opposite foot (contralateral) was done in only 42 cases (58%) where as 30 cases (42%) were left unexamined. (Fig. 2, 3)

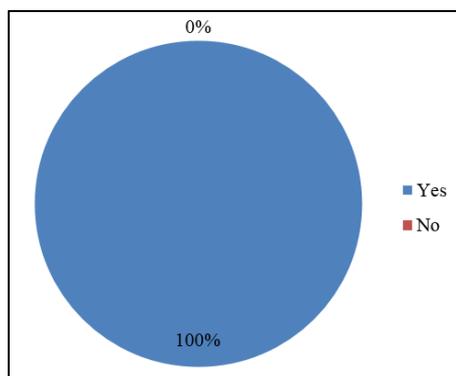


Fig. 2: Distribution of patients having ipsilateral foot examined

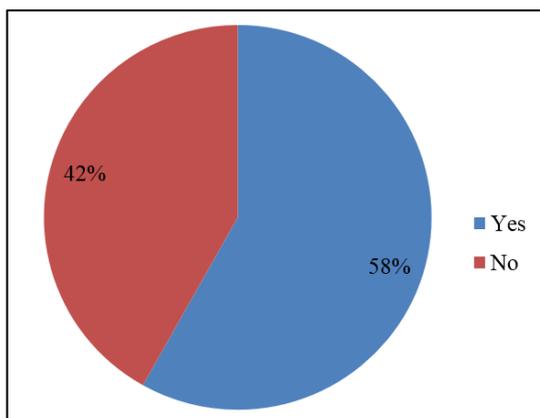


Fig. 3: Distribution of patients having contralateral foot examined

During evaluation of triple component distribution of ipsilateral foot it was found all (100%) of affected foot were inspected (look component), 62 (86.11%) cases had atleast one of the pulses checked (feel component) and only 18 cases (25%) cases had foot sensation tested by using any of the modality - monofilament/tuning fork. In 54 cases (75%) no record of test component was mentioned. On the opposite foot (Contralateral) 42 (58%) feet were inspected (look component), and pedal pulses felt (feel component) in similar number of patients were as in none of the patients sensations were documented (test component)

Table 6: Distribution of components of examination on ipsilateral side of foot

Contra lateral	No. of patients (n = 72)	%
Look		
Yes	72	100
No	0	
Feel		
Yes	62	86.11
No	10	13.88
Test		
Yes	18	25
No	54	75

Table 7: Distribution of components of examination on contra lateral side of foot

Contra lateral	No. of patients (n = 72)	%
Look		
Yes	42	58
No	30	42
Feel		
Yes	42	58
No	30	42
Test		
Yes	0	0
No	72	100

Discussion

In diabetic population development of peripheral neuropathy plays a pivotal role in formation of diabetic foot ulcer and subsequent amputation and hence detection of loss of protective sensation is a must to segregate high risk feet for interventional modalities and allocate medical resources and personell to them for amputation prevention.¹⁰ Despite knowledge of the fact that diabetic foot ulceration can be prevented by thorough routine foot evaluation, in majority cases foot assessment is largely incomplete and also missed.

In a study by Berbayer¹¹ on limb care in diabetic patients from Canada only 40% patients had annual examination by doctor just once. In another study from Tanzania by Chiwanga¹² et al, 27,5% feet were

examined by a doctor. Salem et al¹³ in their study on Asian subjects found their foot examination was missed in 61.9% patients. In a study by Kumar et al¹⁴ they reported only 13.8% of diabetic feet were examined. In fact there are data to suggest that proper foot evaluation was done only in 20% of the time.

A clinical audit by Ismail et al¹⁵ also reported paucity of adequate foot evaluation with none of the feet tested for sensation. In a study by Santosh et al¹⁶ on diabetic in-patients in medical wards only 7.7% of diabetic patients were examined and findings of component distribution of Amit Jain's triple assessment reported 6.2% feet inspected, 1.5% pedal pulses felt, none had sensation tested and contralateral foot was not examined in any of the subjects. In Jain et al¹⁷ series on inpatients of surgical wards it was found that in 94% cases affected foot was inspected, 58% had pedal pulse evaluated and in only 2% sensation was tested; in contrast to contralateral foot where 2% cases were inspected, 2% had pedal pulses palpated and none evaluated for sensation testing.

In our study we found that all patients were examined on affected side and only 58% had opposite foot examined. On triple assessment of component distribution 100% feet were inspected, in 86% pedal pulses were felt and only 25% tested for sensations with no record of test component available in 75% subjects on ipsilateral side. On contralateral side 58% of each were inspected and pedal pulses evaluated but none had foot sensation documented. All patients were admitted to surgical wards based on inspection and palpation findings and also choice of surgical procedures and outcome was based on local examination findings; hence relatively better and adequate evaluation was done in surgical wards.

Conclusion

Regular and adequate routine foot examination compiled with good foot care are cornerstone in amputation prevention in diabetic foot patients. A rapid simple inexpensive screening tool ensures and enables foot examination by health care professional. Amit Jain's triple assessment fulfils all above criteria and is an essential part of wholesome foot evaluation carried out by health care worker. It promotes early identification of high risk feet and also helps in proper diagnosis and categorization of foot lesions by effectively addressing triopathy in diabetic foot.

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