Pathophysiology/Complications ORIGINAL ARTICLE Amputation and Mortality in New-Onset Diabetic Foot Ulcers Stratified by Etiology PROBAL K. MOULIK, MRCP1 ROBERT MTONGA, MB2 GEOFFREY V. GILL, MD1 OBJECTIVE -- Foot ulcers and their complications are an important cause of morbidity and mortality in diabetes.Diabetes Care 12:24 -31, 1989 Apelqvist J, Ragnarson-Tennvall G, Pers- son U, Larsson J: Diabetic foot ulcers in a multidisciplinary setting: an economic analysis of primary healing and healing with amputation.Med Clin North Am 82:949 -971, 1998 Maser RE, Nielsen VK, Bass EB, Manjoo Q, Dorman JS, Kelsey SF, Becker DJ, Or- chard TJ: Measuring diabetic neuropathy: assessment and comparison of clinical ex- amination and quantitative sensory test- ing.Adler AI, Boyko EJ, Ahroni JH, Smith DG: Lower-extremity amputation in diabetes: the independent effects of peripheral vas- cular disease, sensory neuropathy, and foot ulcers.Diabet Foot 5:51-53, 2002 Bild DE, Selby JV, Sinnock P, Browner WS, Braveman P, Showstack JA: Lower- extremity amputation in people with dia- betes: epidemiology and prevention.Cardiac and cerebrovascular diseases ac- counted for the majority of deaths (38%), followed by pneumonia (27%), emphy- Patients (n) Age (years) Sex Male Female Diabetes Type 1 Type 2 Unclassified Ulcer type Neuropathic Ischemic Neuroischemic Other Total 185 65 ?Tan JS, Friedman NM, Hazelton-Miller C, Flanagan JP, File TM: Can aggressive treatment of diabetic foot infections re- duce the need for above-ankle amputa- tion?A standard neurological examination tested the sensation to light touch (cotton wool), pain (sterile neuro- logical examination pins [Neurotips]), vi- bration (128-Hz tuning fork), and tendon reflexes at the ankle (3).Kaplan-Meier survival curves were generated for the cohort, and the log-rank test was used to test equality of survivor Foot ulcers and their complications are an important cause of morbidity and mortality in patients with diabe- tes.Boyko et al. (17) reported a relative risk of death of 2.39 among diabetic patients developing new foot ulcers and commented that overall high mortality in all the ulcer sub- types suggests that diabetic foot ulcers may serve as a marker of as-yet-unknown conditions increasing mortality.RamseySD,NewtonK,BloughD,McCul- loch DK, Sandhu N, Reiber GE, Wagner EH: Incidence, outcomes, and cost of foot ulcers in patients with diabetes.Peripheral vascular disease (PVD) was considered present when both the dorsalis pedis and poste- rior tibial pulses were absent in the af- fected limb (4).On multinomial regression analysis, among the variables, only age predicted mortality and none was independently re- Table 2--Five-year amputation rates and time to amputation Neuropathic (N) Neuroischemic (NI) Ischemic (I) Other 28 Cases (n) (n) 83 30 44 Amputation Time to amputation (months) 58 (55-61) 62 (58-65)* 54 (44-62) 52 (44-60)??We believe that those who developed ulcers in the absence of clinical neuropathy were Moulik, Mtonga, and Gill Cases (n) Overall 185 Ulcer type 5-year mortality Deaths Survival (n) (months) (%) 52 50 (47-54) 44 Data are means (95% CI) unless noted otherwise.Mayfield JA, Reiber GE, Nelson RG, Greene T: A foot risk classification system to predict diabetic amputation in Pima In- dians.Anagnostopoulos D FA, Bates M, Doxford M, Wilson S, Edmonds ME: Mortality in diabetic foot ulcer patients: major differ- ence between ischaemic and neuropathic patients (Abstract).The present study aims to examine outcomes in patients with new-onset dia- betic foot ulcers of various etiologies with reference to amputations and mortality.Lee JS, Lu M, Lee VS, Russell D, Bahr C, Lee ET: Lower-extremity amputation: in- cidence, risk factors, and mortality in the Oklahoma Indian Diabetes Study.Boyko EJ, Ahroni JH, Smith DG, Dav- ignon D:

Increased mortality associated with diabetic foot ulcer.The present study aims to examine the long-term outcome in terms of amputations and mortality in patients with new-onset diabetic foot ulcers in subgroups stratified by etiology.RESULTS -- Of the 185 patients studied, 41% had peripheral vascular disease (PVD) and 61% had neuropathy; 45%, 16%, and 24% of patients had neuropathic, ischemic, and neurois- chemic ulcers, respectively.Address correspondence and reprint requests to Dr. Probal K. Moulik, MRCP, Department of Diabetes, Flat 39, Coniston House, University Hospital Aintree, Liverpool, L9 7AL UK. E-mail: p.moulik@virgin.net.Similarly, on multi- variate forward stepwise Cox regression analysis to estimate time to outcome, age predicted shorter survival time (P ?However, mean age at presentation of ischemic ul- cer patients was about 8 years more than that of neuropathy patients, and on the multinomial regression analysis model, only increasing age was found to predict mortality.The mortality appears to be independent of factors increasing ulcer risk, i.e., neur- opathy and PVD, in patients with estab- lished diabetic foot ulcers.3):S61-S64, 1998 Carrington AL, Mawdsley SK, Morley M, Kincey J, Boulton AJ: Psychological status of diabetic people with or without lower limb disability.Diabe- tes 42:876 - 882, 1993

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