

Mortality, Re-Amputation And Post Operative Complication Rates Following 28,000 Below Knee Amputations In Diabetic Patients In England: A National 20 Year Population Study

Orthopaedics / Foot & Ankle / Epidemiology, Prevention & Diagnosis

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Background

Diabetes mellitus remains a major pandemic affecting 415 million people globally (9% of adults), of which 4 million are in the UK. Urgent below knee amputation (BKA) remains a last resort treatment for intractable diabetic foot disease. UK national audit data suggests that despite reported improvements in ulcer healing rates following widespread investment in national guidelines for diabetic foot care, the BKA rate has not improved. The overall mortality rate associated with BKA for diabetic foot disease remains unclear, with smaller cohort studies reporting a wide range of 1 year mortality rates from 13.8% to 61.1%. There is no consensus on mortality rates, risks of perioperative complications and which risk factors predispose patients with diabetic foot disease to poorer outcomes post BKA in England.

Objectives

We wished to use Hospital Episodes Statistics (HES) data for England to examine mortality following BKA across a 22-year period. Secondary outcomes included causes of death, re-amputation rates, temporal variation in post BKA mortality and 90 day complication rates.

Study Design & Methods

HES data was obtained from NHS digital and combined with Office of National Statistics (ONS) mortality data from 2000 to 2022. We included data on all patients over 18 years of age who underwent a major lower limb amputation from 2000-2022 in England. Data was cleaned using HES data dictionaries. Operations and complications were identified according to the OPCS-4 and ICD-10 codes. Analysis was performed using STATA 18 (STATAcorp, college station, Texas). Mortality and amputation free survival was calculated with Kaplan-Meier curve analysis. Multivariate logistic regression was used to stratify patient variables associated with mortality and/or re-amputation rate.

Results

We identified 24,711 BKAs undertaken in diabetics in the 20 year period. The rates of BKA decreased from 2002 (8.1/100,000) to 2012 (6.2/100,000) and plateaued between 2012-2022 (6.5/100,000 in 2022). The rates are significantly higher in males (9.4/100,000 in 2022) when compared to females (3.3/100,000 in 2022) and highest in males aged 60-79 years old (14/100,000 in 2023). The 90-day reoperation rate for any cause was 10.4%. The ipsilateral re-amputation rate at any time was 3.2% (n=808), and the contralateral amputation rate was 11% (n=2719). Additional 90-day complications included PE (0.59%, n=145), MI (3.2%, n=799) and

Stroke (1.5%, n=367). The mortality rates following BKA for diabetic foot disease were 4.6% at 30 days, 11.3% at 90 days, 23.6% at 1 year, and 58.2% at 5 years. Only 21.5% of patients survived to 10 years post BKA. Multi-regression analysis demonstrated that female sex, lower socio-economic status and British Asian males aged 60-70 years had significantly higher BKA associated mortality rates. Female sex was associated with higher mortality at all time points (OR 1.07, 1.12, 1.15, 1.16 at 30 days, 90 days, 1 year and 5 years respectively). Increasing age was associated with significantly worse mortality at all time-points. Lower deprivation status (higher socioeconomic status) was associated with better longer-term outcomes.

Conclusions

This landmark 20 year England population study has revealed that BKA is still associated with high mortality rates, perioperative morbidity, high rate of further amputation and high incidence of significant complications including pulmonary emboli. While BKA can be a lifesaving procedure in patients with diabetic foot disease, overall, there has been little improvement in post BKA mortality over the last 20 years