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Glioblastoma in England: 2007–2011

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Abstract ***Aims:*** Glioblastoma (GBM) is the most common and aggressive primary malignant brain tumour in adults, with a poor prognosis. Changing treatment paradigms suggest improved outcome, but whole nation data for England is scarce. The aim of this report is to examine the incidence of patients with glioblastoma in England, and to assess the influence of gender, age, geographical region and treatment on outcome.

Methods: A search strategy encompassing all patients coded with GBM and treated from January 2007 to December 2011 was obtained from data linkage between the National Cancer Registration Service and Hospital Episode Statistics for England.

Results: There were 10,743 patients coded with GBM in this 5-year period (6451 male, 4292 female), giving an overall national age standardised incidence of 4.64/100,000/year. Incidence increases with age. Median survival overall was 6.1 months. One, 2 and 5-year survivals, were 28.4%, 11.5% and 3.4% respectively. Age stratified median survivals decreased significantly ($p < 0.0001$) with increasing age from 16.2 months for the 20–44 year age group, to 7.9 months for the 45–69 years, and 3.2 months for 70+ years. In the maximal treatment subgroup, patients aged up to 69 years had a median survival of 14.9 months. Patients over 60 years were less likely to receive maximal combination treatment but median survival was better with maximal treatment at all ages.

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Conclusions: The overall outcome for patients with GBM remains poor. However, aggressive treatment at every age group is associated with extended survival similar to that described in clinical trials.

1. Introduction

Glioblastoma (GBM: World Health Organisation (WHO) grade IV glioma) is the most common and aggressive primary malignant brain tumour in adults [1]. The international estimated age adjusted incidence for all patients with primary malignant brain tumours (not exclusively GBM) is 5.3 per 100,000 population with higher rates in some western developed countries [2]. Few patients with GBM survive long term with reported median survivals of 6–9 months (Johnson, 2012, Darefsky, 2012).

In 2005 an European Organisation for Research and Treatment of Cancer and the National Cancer Institute of Canada Clinical Trials Group (EORTC/NCIC) phase III randomised trial showed the benefit of adding concurrent and adjuvant temozolomide, an oral alkylating agent that penetrates the blood brain barrier, to radiotherapy with a median survival of 14.6 months and 5-year survival of 9.8% [3,4]. Since publication, this protocol has become the standard of care for patients with GBM. Reports suggest an improvement in outcome since the widespread introduction of temozolomide after 2005, but complete whole country data for England is scarce. Only one previous national study examined the cancer journey of patients diagnosed with glioblastoma and treated in 2004–2005 in England and reported 21% 1-year survival [5]. The impact of the introduction of temozolomide on the combined patient outcome may be less than predicted as incidence peaks in the elderly, yet patients older than 70 years were not recruited to the EORTC/NCIC trial, and many may not receive temozolomide [3].

Between 2011 and 2013 English cancer registry data were centralised allowing ready exploration of national data on patients with brain tumours across the whole of England for the first time (approx 53.5 million people in 2012, Office for National Statistics 2013). These data are linked to data on hospital admissions (Hospital episode statistics: HES), which include treatment related to surgery, chemotherapy and pathology and radiology reports. In addition, multidisciplinary team meetings (MDTs; or tumour boards) feed diagnostic and therapy data directly to the National Cancer Registration Service (NCRS). This makes England uncommon in having detailed whole nation incidence and treatment data for all patients diagnosed with cancer. Here, we report the incidence and survival of patients with GBM in England 2007–2011 (Inclusive), and examine the relationship between age, sex, geographical region, treatment and outcome.

2. Methods

2.1. Patient cohort

We included all patients diagnosed with cranial glioblastoma (ICD10 site: C71, ICDO2 morphology 9440/3, 9441/3 and 9442/3) between 1st Jan 2007 and 30th Dec 2011, who were resident in England as registered by the NCRS. The NCRS holds data collated from electronic and paper-based reports, clinical notes, pathology reports and HES records (http://www.hscic.gov.uk/hes), which reports diagnosis as ICD-10 code and procedures using OPCS 4 (UK national classification of interventions and procedures version 4: http://systems.hscic.gov.uk/data/clinical coding/codingstandards/opcs4) for all patients admitted to hospital. Chemotherapy linked data describe treatment provision but not type, and company data provide unlinked temozolomide sales in England. Radiotherapy data are only complete from 2012 and were not used in this analysis. Data elements include age at diagnosis, tumour site, morphology, behaviour, WHO grade and treatment.

Vital status was checked using the NHS Personal Demographics Service (PDS) (http://systems.hscic.gov.uk/demographics/pds/). In this analysis, surgery encompasses all debulking procedures but not biopsy. HES data linkage were not complete but in eight of the nine regions were over 93%. The East of England (HES linkage 83%) used patient admission statistics (PAS) as the main source of hospital treatment data so would not normally match their data to HES. There was no significant difference between year of diagnosis, age and degree of linkage. Unlinked data between HES and NCRS were included in the analysis as other sources of treatment data including PAS, hospital notes and path reports could be used.

2.2. Statistical analysis

Annual European Age Standardised Incidence rates per 100,000 population were calculated for overall and age specific cohorts, using standard techniques. The standard population used is the 2013 European Standard Population (Annex F, http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-RA-13-028/EN/KS-RA-13-028-EN.PDF) and the maximum age band is 85+.