Prognostic Value of N-Terminal Pro-B-Type Natriuretic Peptide Concertation in Brain Tumor Patients: A 5-Year Follow up Study

Adomas Bunevicius MD PhD; Vytenis Deltuva; Edward R. Laws MD, FACS; Giorgio Iervasi; Arimantas Tamasauskas

Neuroscience Institute and Department of Neurosurgery, Lithuanian University of Health Sciences, Kaunas, Lithuania; Department of Neurosurgery, Brigham and Women's Hospital, Boston, Massachusetts, USA; CNR - Institute of Clinical

Introduction

N-terminal pro-B-type natriuretic peptide (NT-proBNP) is produced by ventricular cardiomyocytes in response to volume or pressure overload. It is an established biomarker for diagnosing and monitoring heart failure. Increased NT-proBNP concentration predicts poor prognosis of non-CNS cancer patients. Furthermore, elevated serum NT-proBNP concentration iwere linked to poor recovery and prognosis after stroke, aneurysmal subarachnoid hemorrhage and traumatic brain injury.

We evaluated the association of NT-proBNP concentration with disease severity, discharge outcomes and prognosis of patients undergoing elective craniotomy for brain tumor.

Methods

From January, 2010 until September, 2011 two-hundred and forty-five patients (mean age 55.05±14.62 years) admitted for brain tumor surgery were approached before surgery and evaluated for NT-proBNP serum concentration. Ninety-four patients were also evaluated for cognitive functioning (Mini Mental State Examination or MMSE), functional status (Barthel Index or BI) and depressive symptom severity (Hospital Anxiety and Depression scale or HADS). Outcome at hospital discharge was evaluated with the Glasgow Outcome Scale (GOS). Follow-up continued until November, 2015.

Results

The study patients were diagnosed with meningioma (37%), high-grade glioma (20%), pituitary adenoma (14%) and low-grade glioma (9%). Twenty seven (11%) patients had histories of cardiovascular disorders.

The median NT-proBNP concentration was 93.15 [173.00] ng/L and NT-proBNP concentration was elevated in 80 (33%) patients.

The proportion of patients with elevated NT-proBNP concentration was greater in patients with

There was a strong and positive correlation between patient age and NT-pro-BNP concentration (rho=0.581, p<0.001). Greater NT-proBNP concentration was associated with lower BI (rho = -0.305) and MMSE scores (rho = -0.314) and with greater HADS-Depression score (rho = 0.240).

NT-proBNP concentrations above the reference range (equal to or greater than 157 ng/l) was associated with greater odds for unfavorable outcome at hospital discharge (GOS score of 3 of worse) adjusting for age, gender and histological diagnosis (HR = 2.268 95%CI [1.04-3.493], p=0.039).

NT-proBNP concentration above the median value (equal to or greater than 93.15 ng/L) was associated with greater 90-day (HR = 4.416, 95%CI [1.157 – 16.851], p=0.03) and 5-year (HR = 1.687; 95%CI [1.038-2.743], p=0.035) mortality risk controlling for age, gender, histological diagnosis and adjuvant therapy (Figure 1).

Figure 1: Kaplan-Meyer curve of 5-year survival as a function of NT-proBNP concentration above the median value.
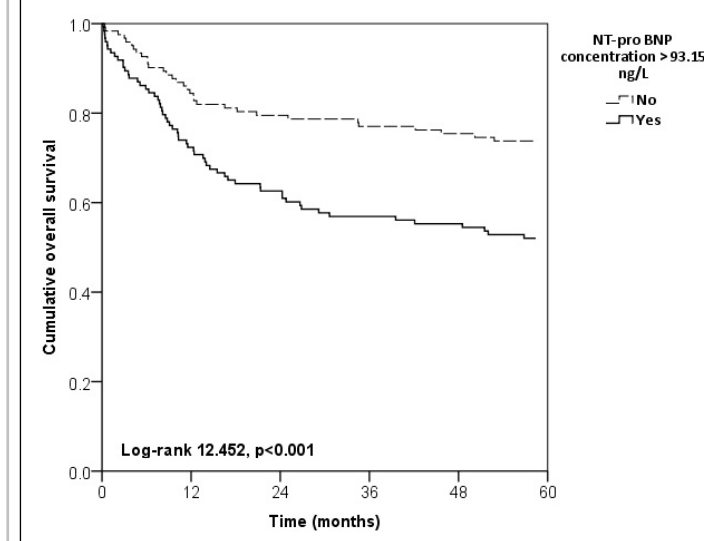
Conclusions

Serum NT-proBNP concentrations increase in patients with brain tumors. Greater NT-proBNP concentration is associated with worse health status and with cognitive impairment. Elevated NT-proBNP concentration before surgery is associated with worse outcomes at hospital discharge and with worse prognosis of brain tumor patients. Therefore, NT-proBNP assessment can be considered for peri-operative risk stratification, prognostication and when evaluating cognitive/mental health status of brain tumor patients. Studies investigating the clinical significance of NT-proBNP in brain tumor patients are recommended.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of preoperative N-terminal pro-B-type natriuretic peptide assessment in brain tumor patients, 2) Discuss prognostic value of N-terminal pro-B-type natriuretic peptide in neurosurgical patients, 3) Better prognosticate peri-operative outcomes and prognosis of brain tumor patients.

References

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