

Low T3 syndrome predicts unfavorable outcomes in surgical patients with brain tumor

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In a study of 90 patients undergoing surgery for brain tumor, researchers in Lithuania (Lithuanian University of Health Sciences) and the United States (University of North Carolina at Chapel Hill and Brigham & Women's Hospital, Harvard University) have discovered that the finding of low T3 (triiodothyronine) syndrome is predictive of unfavorable clinical outcomes and depressive symptoms. Details of this study are furnished in the article "Low triiodothyronine syndrome as a predictor of poor outcomes in patients undergoing brain tumor surgery: a pilot study.

Clinical article," by Adomas Bunevicius, M.D., Ph.D., and colleagues, published today online, ahead of print, in the [Journal of Neurosurgery](#).

Low T3 syndrome is a term used to describe the finding of low blood serum concentrations of T3, which can be accompanied by abnormal T4 (thyroxine) to T3 conversion and high concentrations of reverse T3 (rT3) without any obvious sign of thyroid disease. Previous reports have shown that the finding of low levels of T3 in critically ill patients and patients undergoing [surgery](#) for some disorders is widespread and associated with unfavorable clinical outcomes. To see if this was true for patients undergoing brain tumor surgery, Dr. Bunevicius and colleagues performed perioperative thyroid function tests. (Surgery is the most common treatment for [brain tumors](#).) The researchers also examined whether there was an association between low T3 syndrome and symptoms of anxiety and depression, which in patients harboring brain

tumors are common complications and are associated with poor prognoses.

The researchers evaluated thyroid function profiles in 90 patients (median age 55 years, 71% women) on the morning of brain surgery and again on the following morning. If patients were found to have a free T3 level of 3.1 picomoles per liter (pmol/L) or less, they were given a diagnosis of low T3 syndrome. The Hospital Anxiety and Depression Scale was used pre- and postoperatively to identify cases of anxiety and depression. The Glasgow Outcome Scale was used at the time of hospital discharge to determine clinical outcomes.

The researchers identified a high prevalence of low T3 syndrome in this patient cohort: 38% of patients before brain tumor surgery and 54% of patients after surgery. In a comparison of preoperative and postoperative thyroid hormone profiles, the researchers found significant decreases in the concentrations of free T3 and thyroid-stimulating hormone (TSH) as well as in the T4 to T3 conversion; they also found significant increases in the concentration of free T4 (all p regression analysis as well as in a multivariate binary regression analysis in which adjustments were made for patient age and sex, preoperative impairments in function, histological type of brain tumor, and previous treatment for brain tumor).

There were significant improvements in postoperative scores for symptoms of depression and anxiety, when compared with scores obtained preoperatively. The researchers found a four-fold increased risk of preoperative symptoms of depression in patients with preoperative low T3 syndrome. The association between these two factors was verified in a univariate regression analysis and in a multivariate regression analysis in which adjustments were made for sociodemographic and clinical factors.

The researchers note: "this is the first study to examine perioperative

thyroid axis function in patients undergoing brain tumor surgery." The primary finding of the study is that low T3 syndrome is a clear biomarker for unfavorable clinical outcomes in this patient group. Diagnosis and preoperative management of low T3 syndrome should therefore be a consideration in patients undergoing surgery for brain tumor. Adds Dr. Adomas Bunevicius, the first author, "Thyroid hormone concentrations can easily be investigated in routine clinical settings. The tests are inexpensive and readily available worldwide. Thyroid hormone concentrations can be potentially relevant for risk stratification in patients undergoing surgery for brain tumors."

More information: Bunevicius A, Deltuva V, Tamasauskas S, Tamasauskas A, Laws ER Jr., Bunevicius R. Low triiodothyronine syndrome as a predictor of poor outcomes in patients undergoing brain tumor surgery: a pilot study. Clinical article. *Journal of Neurosurgery*, published online, ahead of print, March 12, 2013; DOI: [10.3171/2013.1.JNS121696](https://doi.org/10.3171/2013.1.JNS121696)

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