

Amiodarone and radiocontrast agents correlate differently with the pattern of NTIS

A. Urban¹, A. Jeyabalan¹, A. Ackermann¹, Y. Kanthasamy¹, T. Tharmalingam¹, A. Stachon³, R. Köditz¹, R. Gärtner⁴, E. Conrad-Opel², H.H. Klein¹, S. Hering⁵, J. W. Dietrich¹

¹Medical Hospital 1 and ²Institute for Anesthesiology and Intensive Care, Bergmannsheil University Hospitals, Ruhr University of Bochum, Germany

³Department for Laboratory and Transfusion Medicine, Westfal-Klinikum Kaiserslautern, Germany

⁴Medical Downtown Hospitals, Ludwig Maximilian University of Munich, Germany. ⁵Krankenhaus Bietigheim, Bietigheim-Bissingen, Germany

Background

Patients suffering from critical illness frequently exhibit a characteristic functional state of thyrotropic feedback control that is referred to as non-thyroidal illness syndrome (NTIS)^{1,2,3}.

This condition is associated with significantly increased morbidity and mortality of affected patients^{1,3}.

While the prevalence of low T3 syndrome is exceptionally high and its relevance for prognosis of affected patients is well known, its physiological mechanisms are still poorly understood.

Here, we investigated the association of drugs or procedures that expose the organism to a high iodine load, i.e. amiodarone and radiocontrast agents, with prevalence and pattern of NTIS.

Methods

In the context of the prospective AQUA FONTIS study⁵ we investigated 353 patients with heart diseases (271 patients with ischemic heart diseases like myocardial infarction and other forms of acute coronary syndrome, and 82 patients with valvular heart diseases) that were treated in medical and heart-surgical intensive care units (ICUs) of the Bergmannsheil University Hospitals in Bochum, Germany.

Thyroid hormones were determined 24 hours, 72 hours, one week, two weeks and three weeks after admission to ICU. Deiodinase activity was calculated from T3 and T4 levels⁴. Urine samples were obtained 24 hours after admission to the ICU.

Results

Patients that were treated with amiodarone showed a significantly reduced theoretical sum activity of peripheral 5'-deiodinase in the adjacent evaluation points after 72 hours and after one week.

Radiocontrast agents were associated with increased protein binding of T4 after 24 hours and 72 hours as evaluated by the TT4/FT4 ratio.

Radiocontrast agents combined with amiodarone, however, were associated with reduced protein binding of T3 after 72 hours and after a week.

In a pooled analysis with 57 ambulatory outpatients, iodine excretion correlated with deiodinase activity. However, this correlation was not observed in the subgroup of critically ill patients.

Conclusions

In conclusion, amiodarone and radiocontrast agents are associated with different alterations of thyroid homeostasis in critically ill patients.

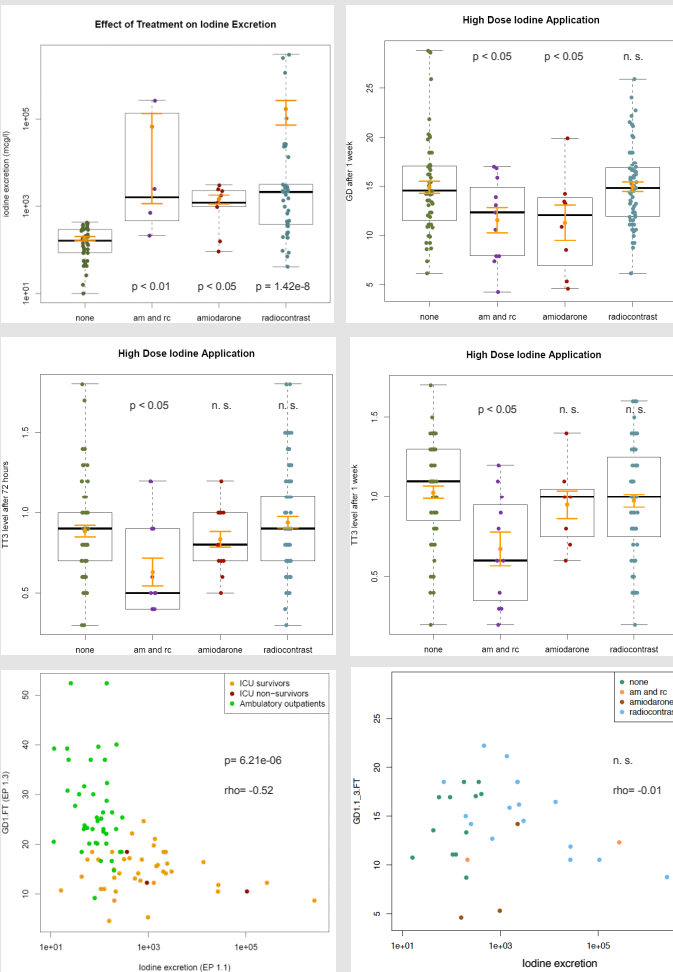
The inhibiting influence of amiodarone on the sum activity of the peripheral 5'-deiodinase seems not to be due to the iodine load of amiodarone. This may be a consequence of a nonlinear interaction of iodine supply with deiodation.

Patient characteristics

Gender	103 female	250 male
Cardiogenic shock	24 with shock	329 without shock
Resuscitation	25 resuscitated patients	328 not resuscitated
Survival	31 died	322 survived

Treatment

No iodine load	Amiodarone	Radiocontrast agents	Both amiodarone and radiocontrast agents	No data
142	22	152	19	18



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