

2 Summary

Introduction:

Despite more than 60 years' experience with radioactive iodine ^{131}I (RAI) treatment of Graves' disease (GD) the most appropriate dosing regimen is still controversial. Namely, there has been a lot of discussion comparing the individualized dose to the fixed dose (activity).

Objective:

The main objective of our research was to analyze the outcome of RAI therapy depending on the initial status of patients and to relate the success rate of RAI therapy to the fixed activity and to the adjusted dose. Our practical objective was to suggest the arrangement of dosing regimen in clinical use on the basis of researched data.

Patients and methods:

Retrospectively, we analyzed 603 patients with GD (500 women and 103 men, mean age 51.5 ± 12.7 years) treated with RAI in our thyroid unit between the years 1998-2012. According to recommended practice in the Czech Republic, most patients came with at least 1-year history of the disease, in the first or next relapse. Their antithyroid medication was withdrawn 4 days before RAI administration. Initially, RAI activity corresponding to dose ca. 3.2-6.2 MBq/g (adjusted to thyroid volume and 24-hour RAI accumulation) was used. Since 2001, we administered at least 6.5 MBq/g, median 8.5 MBq/g. The treatment was considered successful if patients were euthyroid or hypothyroid on follow-up.

Results:

Total efficacy of RAI treatment was 74 % in 6 months and 88 % in 12 months. For detailed analysis we divided our cohort into tertiles (201 patients each) according to the adjusted dose and according to the administered activity. While the success rate of RAI therapy increased with rising adjusted dose ($P < 0,001$), the RAI therapy was not dependent on the administered activity ($P = 0,833$). Further division of our cohort into deciles identified 3 relatively homogenous subgroups according to adjusted dose, as related to the efficacy of treatment: (a) in the first group ($n = 120$) with adjusted dose 0.5-5.0 MBq/g the success rate was 54 % in 6 months and 72 % in 12 months, (b) in the second group ($n = 239$) with adjusted dose 5.1-8.4 MBq/g it was 71 % and 86 %, respectively and (c) in the third group with adjusted dose 8.5-77.2 MBq/g it was 86 % and 96 %, respectively. Median adjusted dose in the second group was 6.8 MBq/g. In the detailed analysis of the third group, any further dose increase over 8.5 MBq/g did not result in higher cure rates. In patients with higher thyroid volume ($P < 0,001$) and higher disease activity (i.e. higher fT₄, FT₄, TSHR-Ab and 24-hour RAI accumulation as well as suppressed TSH), there was an increased risk of treatment failure. The therapy efficacy was not dependent on sex ($P = 0.580$) and age ($P = 0.578$).

Conclusion:

We clearly demonstrated an advantage of calculated dose. With adjusted dose about 8.5 MBq/g, very reasonable efficacy was attained. In patients with smaller gland and lower disease activity, it is possible to administer lower adjusted dose ca. 6.5-7 MBq/g. A fixed dose may be a workable alternative when thyroid size measurement and RAI uptake assessment is not available but then the dose (activity) must be high enough, at least 370 MBq.

Key words: radioactive iodine ^{131}I , Graves' disease, fixed dose, calculated dose