Strahlentherapie und Onkologie, 2002

Oxygenation measurements in head and neck cancers during hyperbaric oxygenation

Becker A et al

Tumor hypoxia has proven prognostic impact in head and neck cancers and is associated with poor response to radiotherapy. Hyperbaric oxygenation (HBO) offers an approach to overcome hypoxia. We have performed pO2 measurements in selected patients with head and neck cancers under HBO to determine in how far changes in the oxygenation occur and whether a possible improvement of oxygenation parameters is maintained after HBO. Seven patients (five male, two female, age 51-63 years) with squamous cell cancers of the head and neck were investigated (six primaries, one local recurrence). The median pO2 prior to HBO was determined with the Eppendorf histograph. Sites of measurement were enlarged cervical lymph nodes (n = 5), the primary tumor (n = 1) and local recurrence (n = 1). Patients then underwent HBO (100% O2 at 240 kPa for 30 minutes) and the continuous changes in the oxygenation during HBO were determined with a Licox probe. Patients had HBO for 30 minutes (n = 6) to 40 minutes (n = 1). HBO was continued because the pO2 had not reached a steady state after 30 minutes. After decompression, patients ventilated pure oxygen under normobaric conditions and the course of the pO2 was further measured over about 15 minutes. Prior to HBO, the median tumor pO2 in the Eppendorf histography was 8.6 +/- 5.4 mm Hg (range 3-19 mm Hg) and the pO2 measured with the Licox probe was 17.3 +/- 25.5 mm Hg (range 0-73 mm Hg). The pO2 increased significantly during HBO to 550 +/- 333 mm Hg (range 85-984 mm Hg, p = 0.018). All patients showed a marked increase irrespective of the oxygenation prior to HBO. The maximum pO2 in the tumor was reached after 10-33 minutes (mean 17 minutes). After leaving the hyperbaric chamber, the pO2 was 282 +/- 196 mm Hg. All patients maintained an elevated pO2 for further 5-25 minutes (138 +/- 128 mm Hg, range 42-334 mm Hg, p = 0.028 vs the pO2 prior to HBO). Hyperbaric oxygenation resulted in a significant increase in the tumor oxygenation in all seven investigated patients. A significant increase at the point of measurement could be maintained for several minutes after decompression and after leaving the hyperbaric chamber.