Hyperbaric Oxygen and Antineoplastic Drugs in the Treatment of Intermediate and Advanced Hepatic Cancer


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Huang JL, Shao ZA, Yang AQ, Shi JM, Li FC, Guo ZW. Hyperbaric oxygen and antineoplastic drugs in the treatment of intermediate and advanced hepatic cancer. J Hyperbaric Med 1991; 6(3):155-157.—We studied 19 patients with intermediate and advanced hepatic cancer; 9 patients were treated with hyperbaric oxygen (HBO) and antineoplastic drugs, and 10 patients were treated only with antineoplastic drugs. Results revealed that survival time is 6-17 mo. in the former group and 4-8 mo. in the latter (P < 0.05). We conclude that treatment of hepatic cancer with HBO and antineoplastic drugs is appropriate to achieve a longer survival.

hyperbaric oxygen, intermediate and advanced hepatic cancer, antineoplastic drugs, radiopharmacologic material

Introduction

Treatment of intermediate and advanced hepatic cancer is difficult. We obtained good results when we included adjunctive hyperbaric oxygen (HBO) therapy in the treatment regimen. Nine patients were treated with adjunctive HBO and antineoplastic drugs, and 10 patients were treated with antineoplastic drugs only. We obtained better results with the former management than with the latter.

Materials and Methods

Nine patients (7 males and 2 females, ages 28–46 yr) with intermediate and advanced hepatic cancer were treated with HBO and antineoplastic drugs. All patients were not suited for resection: 2 had undergone tumor resection after hepatic artery ligation for 3 mo. Pathologic diagnosis in 5 patients was hepatic cell carcinoma. Serum α-fetoprotein (α-FP) concentrations were above 400 μg/ml in 9 patients, and 7 patients were positive for HBsAg. Ascitic fluid and puffiness of the lower extremities were present in 1 patient. An additional 10 patients served as controls and received only antineoplastic drugs.
The 9 patients received HBO therapy approximately 20 min after i.v. injection of a homogenous solution of 4 mg of mitomycin C and 20 ml of 0.9% NaCl solution. These patients were breathing 100% oxygen in a monoplace chamber. A treatment course was compression for 60 min at 2.5 atm abs, once daily for 12 days; the interval between treatment courses was 3 mo., and 2 patients were given three courses.

The 10 patients in the control group received only i.v. injections of a homogenous solution of 4 mg mitomycin C and 20 ml of 0.9% NaCl solution. This treatment was provided once a day for a treatment course of 12 days; the interval between treatment courses was also 3 mo.

Results

Among each group of patients, indices of surveillance included clinical symptoms, white blood cell counts, β-ultrasonic wave examination, hepatic function, HBsAg, α-FP, and time of survival. Patients in the HBO group showed obvious improvement, whereas none in the control group showed improvement in clinical symptoms. Peripheral blood cell count was slightly lowered in the HBO group, whereas in the control group it was lowered significantly. Ultrasonographic examination showed no change in tumor size in either group (Table 1). However, survival time between the 2 groups differed significantly (Table 2).

Discussion

The chemical treatment under HBO kills tumor cells in peripheral blood and prevents metastasis, but does not affect the tumor itself. Ultrasonographic

<table>
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<tr>
<th>Table 1: Clinical Symptom, WBC, and Ultrasonogram</th>
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<td>Group</td>
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<td>HBO, 9 patients</td>
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<td>Control, 10 patients</td>
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<td>↑ = increased; ↓ = decreased;</td>
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<th>Table 2: Time of Survival</th>
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P < 0.05.
examination demonstrated no shrinkage of the tumor after HBO therapy. The
patients’ reactions to the antineoplastic drugs were milder and they felt much
better; their appetites improved and their mental outlook improved. The
combined HBO and drug treatment is more beneficial to postoperative
patients.

It has been reported (1) that the effects of antineoplastic drugs can be
enhanced 10 times when tissue oxygen tension is increased from 30 to 70
mmHg. Using adjunctive HBO, the effects of antineoplastic drugs were lowered
in bone marrow and elevated in carcinoma, resulting in increased
destruction of cancerous cells and decreased influence on bone marrow
function. Under HBO, the effect of antineoplastic drugs was increased. Under
HBO, hydrogen peroxide or other peroxides can be produced in cells, and
those materials can inhibit and destroy the active cellular membrane and
enzyme of tumor cells. Therefore, HBO and antineoplastic drugs may have a
synergistic effect and can inhibit the development of cancerous cells.

There are many reports about this combined treatment. In 1986, 20 cases
of children with leukemia undergoing treatment with chemical antineoplastic
drugs and HBO were reported (2). The disease went into remission in all
these children. A Japanese investigator (1) has reported good results in 25
cases of progressive stomach cancer treated with HBO. Of these 25 cases, 2
underwent total gastrectomy and survived for 17 years. Survival time in
advanced hepatic cancer patients is reported to be 3–6 mo. All of the advanced
hepatic cancer patients were inoperable. Survival time was significantly longer
in 9 patients undergoing HBO treatment: 6 mo. in 1 case, 12 mo. in 1 case,
and over 17 mo. in 1 case ($P < 0.05$).

Two patients who survived over 12 mo. underwent a second operation for
hepatic cancer 3 mo. after hepatic artery ligation. Our results show that this
treatment can alleviate clinical symptoms and lengthen time of survival. It is
one of the effective treatments for intermediate and advanced hepatic cancer
patients.

References

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