Condensed version and key points from the study:

A Gallbladder Carcinoma Patient With Pseudo-Progressive Remission After Hydrogen Inhalation

Study Type & Overview

- This is a case report — meaning it documents a single patient's experience, rather than a clinical trial with a large group. It was published in OncoTargets and Therapy in October 2019.
- It is the first report of pseudo-progression followed by sustained remission after hydrogen inhalation.

The Patient

- A 72-year-old patient presented with metastatic gallbladder cancer and received symptomatic treatment combined with hydrogen inhalation therapy.

What Is "Pseudo-Progression"? This is an important concept in the study. It refers to tumors initially appearing to get worse on scans before they actually improve — a pattern already known to occur with certain immunotherapy drugs. The tumors were initially enlarged and displayed increased tumor marker expression following hydrogen inhalation therapy, after which they continued to remit, similar to the pseudo-progression that occurs after anti-PD-1 treatment.

What Happened During Treatment

- During the first month of hydrogen therapy, the patient's gallbladder and liver tumors continued to progress and intestinal obstruction occurred.

- The intestinal obstruction was gradually relieved after symptomatic treatment, abdominal metastases gradually decreased in size, anemia and low albumin levels were corrected, and both lymphocyte and tumor marker levels returned to normal.

- After two and a half months of therapy, the duodenal obstruction disappeared, the gastric tube was removed, tumor marker levels began to decline, and CT imaging showed the tumors in the gallbladder and liver had gradually reduced. The patient's performance status score was significantly improved.

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Survival Outcome

- The patient was able to return to a normal life two and a half months after beginning hydrogen inhalation and survived for more than 10 months — considered a meaningful outcome for a patient with metastatic gallbladder cancer, which carries a very poor prognosis.

The Proposed Immune Mechanism

- These findings suggest that hydrogen may have an inhibitory effect on PD-1 expression. This links back to the previous study in this series — hydrogen appears to shift exhausted immune cells (PD-1+) toward active immune cells (PD-1−), potentially re-engaging the body's own cancer-fighting response.
- Hydrogen therapy in patients with advanced colorectal cancer has been reported to convert depleted PD-1+ CD8+ T cells into PD-1− CD8+ T cells, which is associated with significantly longer survival.

Conclusions

- This is the first report of pseudo-progression followed by sustained remission after hydrogen inhalation, a phenomenon similar to the pseudo-progression-remission pattern that occurs following PD-1 antibody treatment.

Important Limitations

- This is a single case report involving just one patient, so no statistical conclusions can be drawn.
- The patient also received symptomatic treatment alongside hydrogen therapy, making it impossible to attribute improvement to hydrogen alone.
- Gallbladder cancer is rare and aggressive; this one case, while encouraging, would need to be replicated in larger studies.
- The pseudo-progression pattern means that judging early response to hydrogen therapy by tumour size alone could be misleading.

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