

# Hyperbaric oxygen therapy improves colorectal anastomotic healing

G. S. A. Boersema<sup>1</sup> · Z. Wu<sup>1,2</sup> · L. F. Kroese<sup>1</sup> · S. Vennix<sup>1,3</sup> ·  
Y. M. Bastiaansen-Jenniskens<sup>4</sup> · J. W. van Neck<sup>5</sup> · K. H. Lam<sup>6</sup> · G. J. Kleinrensink<sup>7</sup> ·  
J. Jeekel<sup>7</sup> · J. F. Lange<sup>1</sup>

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## Abstract

**Purpose** Hyperbaric oxygen treatment (HBOT) has been found to improve the healing of poorly oxygenated tissues. This study aimed to investigate the influence of HBOT on the healing in ischemic colorectal anastomosis.

**Methods** Forty Wistar rats were randomly divided into a treatment group that received HBOT for 10 consecutive days (7 days before and 3 days after surgery), or in a control group, which did not receive the therapy. Colectomy with an ischemic anastomosis was performed in all rats. In each group, the

rats were followed for 3 or 7 days after surgery to determine the influence of HBOT on anastomotic healing.

**Results** Five rats from each group died during follow-up. No anastomotic dehiscence was seen in the HBOT group, compared to 37.5 % and 28.6 % dehiscence in the control group on postoperative day (POD) 3 and 7, respectively. The HBOT group had a significantly higher bursting pressure ( $130.9 \pm 17.0$  mmHg) than the control group ( $88.4 \pm 46.7$  mmHg;  $p=0.03$ ) on POD 3. On POD 3 and POD 7, the adhesion severity was significantly higher in the control groups than in the HBOT groups ( $p<0.005$ ). Kidney function (creatinine level) of the HBOT group was significantly better than of the control group on POD 7 ( $p=0.001$ ). Interestingly, a significantly higher number of CD206+ cells (marker for type 2 macrophages) was observed in the HBOT group at the anastomotic area on POD 3.

**Conclusion** Hyperbaric oxygen enhanced the healing of ischemic anastomoses in rats and improved the postoperative kidney function.

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G. S. A. Boersema and Z. Wu contributed equally to this work.

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✉ Z. Wu  
wuzhouqiao@gmail.com

<sup>1</sup> Department of Surgery, Laboratory of Experimental Surgery, Erasmus MC, University Medical Center, Room Ee-173 Postbus 2040, 3000 CA Rotterdam, The Netherlands

<sup>2</sup> Department of Gastrointestinal Surgery, Peking University Cancer Hospital and Institute, Beijing, China

<sup>3</sup> Department of Surgery, Amsterdam Medical Center, Amsterdam, The Netherlands

<sup>4</sup> Department of Orthopaedics, Erasmus MC, University Medical Center, Rotterdam, The Netherlands

<sup>5</sup> Department of Plastic and Reconstructive Surgery, Erasmus MC, University Medical Center, Rotterdam, The Netherlands

<sup>6</sup> Department of Pathology, Erasmus MC, University Medical Center, Rotterdam, The Netherlands

<sup>7</sup> Department of Neuroscience, Erasmus University Medical Center, Rotterdam, The Netherlands

**Keywords** Anastomotic healing · Hyperbaric oxygen therapy · Animal model · Perfusion

## Introduction

Colorectal anastomotic leakage (CAL) is the most serious complication following colorectal surgery, causing substantial morbidity and mortality as high as 33 % [1]. With continuous improvements in surgical techniques and perioperative care, the incidence of this complication still varies between 10 and 13 % [2, 3], hardly decreasing in recent decades despite developments in medical science and technology [4].