

Supplemental Oxygen and the Risk of Surgical Site Infection

Evidence of Compromised Data Requires Correction of Previously Published Meta-analysis

To the Editor:

In a recent analysis investigating the scientific integrity of the work published by Schietroma *et al.*, evidence was found for potential data fabrication in 38 trials reporting on a variety of perioperative interventions, including supplemental oxygen to reduce surgical site infections.¹ While some of these studies have been retracted, others have now come under scrutiny and require further investigation. Major concerns were raised about the impact of these compromised data on the World Health Organization recommendations on surgical site infections,² which included two trials published by Schietroma *et al.* The World Health Organization recommended the use of 80% inspired oxygen fraction. In contrast, two recently published meta-analyses found no argument in favor of high oxygen concentrations when trials by Schietroma *et al.* were excluded.^{1,3}

We published a systematic review and meta-analysis on the effect of intraoperative high inspired oxygen in ANESTHESIOLOGY in 2013,⁴ which included one trial by Schietroma *et al.* The purpose of this Letter is to present the findings of our previous meta-analysis, without the data from Schietroma *et al.* In our meta-analysis, we considered only studies where supplemental oxygen was administered through tracheal intubation under general anesthesia. In the original report, including nine trials (5,103 patients, most who received prophylactic antibiotics), the incidence of surgical site infection was reported as 11.4% with high inspired oxygen fraction (80 to 100%) and 14.1% with normal inspired oxygen fraction (30 to 40%); risk ratio, 0.77 (95% CI, 0.59 to 1.00). Our article concluded that intraoperative high inspired oxygen fraction further decreases the risk of surgical site infection in surgical patients receiving prophylactic antibiotics. After excluding the trial by Schietroma *et al.*, eight studies (5,031 patients) reported an average surgical site infection incidence in any type of surgery of 11.4% with high inspired oxygen fraction and 13.9% with normal inspired oxygen fraction (corrected risk ratio [random effects model], 0.79; 95% CI, 0.59 to 1.04) (fig. 1). Thus, after excluding the trial by Schietroma *et al.*, the point estimate remained stable (only 2% variation in the risk ratio), but the confidence interval became wider and now crosses the line of equality. This loss of precision may indicate that—if the sample size were larger—high inspired oxygen could have a protective effect against surgical site infections.^{5,6} This is consistent with an updated World Health Organization systematic review and meta-analysis that found, after exclusion of data from Schietroma *et al.*, a protective effect of high inspired oxygen fraction in patients undergoing surgery under general anesthesia with tracheal intubation.³

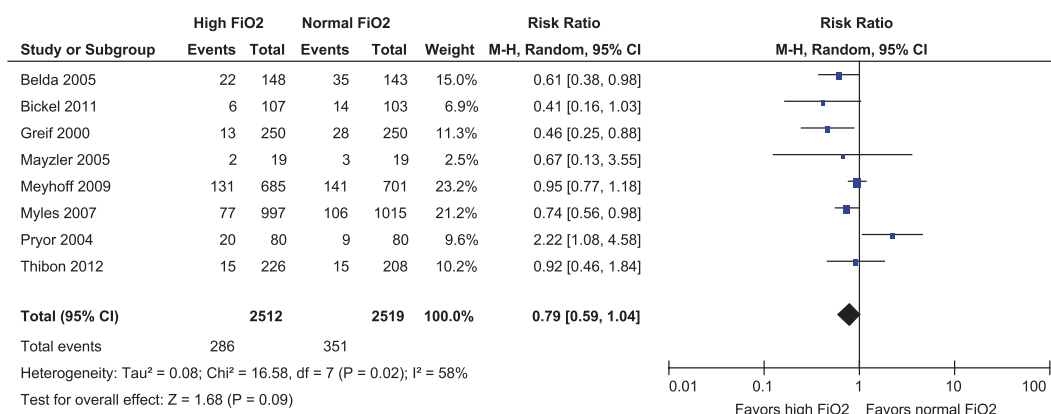


Fig. 1. Forest plot illustrating the risk of surgical site infection after exclusion of the Schietroma trial (any surgery).

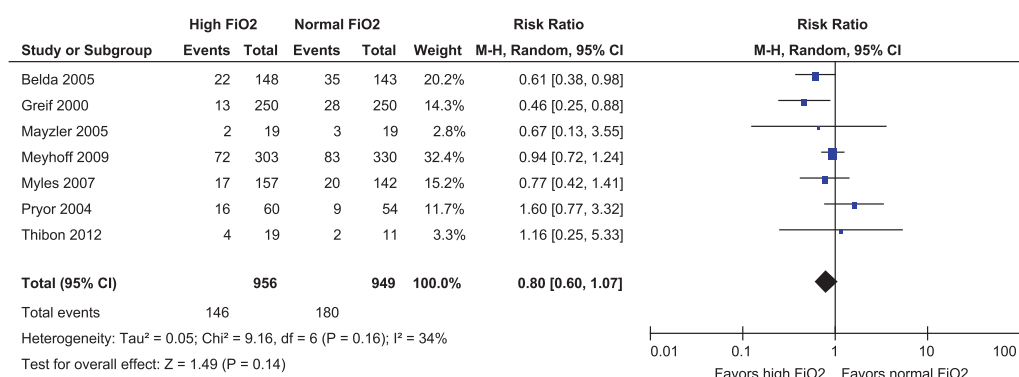


Fig. 2. Forest plot illustrating the risk of surgical site infection after exclusion of the Schietroma trial (colorectal surgery only).

In our initial report,⁴ we performed a subgroup analysis exploring the effect of supplemental oxygen on surgical site infections in colorectal surgery only. In this particular population, the risk ratio was 0.78 (95% CI, 0.60 to 1.02) with data of 1,977 patients. When excluding the retracted trial, the corrected risk ratio was 0.80 (95% CI 0.60 to 1.07) with data of 1,905 patients (fig. 2). Thus, again, the variation in the risk ratio was only 2% and the corrected risk estimate indicated a risk reduction of 20%. However, the lower and upper limits of the 95% CI around the point estimate were compatible with, at best, a 40% benefit and, at worse, a 7% increase in the risk of surgical site infection.

This new set of retractions highlights again the fragility of the scientific evidence base. This is problematic, since it has been shown that retraction of flawed trials takes time, and not all flawed trials are retracted.⁷

Competing Interests

The authors declare no competing interests.

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