Prophylactic chest physiotherapy reduced pulmonary complications after major abdominal surgery


Question
In patients having major abdominal surgery, can prophylactic chest physiotherapy reduce pulmonary complications after surgery?

Design
Randomised controlled trial.

Setting
University hospital in Göteborg, Sweden.

Patients
368 patients who were 19 to 92 years of age (mean age 53 y, 57% women) and were having elective open abdominal surgery. Patients were considered to be high risk if they were > 50 years of age and had ≥ 1 of the following risk factors: current or previous (quit within the past 12 months) history of smoking, body mass index > 30 kg/m², pulmonary disease requiring medication, or another medical condition causing reduced ventilatory function. 79 patients (21%) were high risk.

Intervention
Patients were allocated to prophylactic chest physiotherapy (n = 194) or usual treatment (n = 194). Patients in the physiotherapy group received information and training the day before surgery from a physiotherapist. Training involved breathing exercises with pursed lips and hourly huffing and coughing (30 deep breaths with huffing and coughing between every 10th breath every daylight hour after the operation). The importance of changing position in bed and getting out of bed soon after surgery was emphasised. High-risk patients used positive respiratory pressure masks for respiratory resistance training during the breathing cycle. Patients in the usual-treatment group did not receive physiotherapy training or information before the operation but did receive chest physiotherapy with the mask if pulmonary complications developed after surgery.

Main outcome measures
Pulmonary complications defined as oxygen saturation < 92% or 2 of the following: temperature > 38.2 °C, pathological lung auscultation, or radiologically confirmed pneumonia or atelectasis.

Main results
Fewer patients who received physiotherapy had pulmonary complications after surgery than did patients who received usual treatment (P < 0.001); this reduction was also seen in both high-risk and low-risk patients (P = 0.001 for both) (Table). Greater oxygen saturation was maintained in the physiotherapy group during the first 3 days after surgery (P < 0.05). Therapy groups did not differ for body temperature or need for oxygen support.

Conclusion
Prophylactic chest physiotherapy done before and after major abdominal surgery reduced pulmonary complications.

Physiotherapy vs usual treatment to prevent pulmonary complications

| Patient groups | Physiotherapy | Usual treatment | RRR (95% CI) | NNT (95%)
|----------------|---------------|----------------|-------------|---------|
| All patients   | 6%            | 27%            | 79% (60 to 89) | 5 (3 to 7)
| High-risk patients | 15%          | 51%            | 71% (38 to 87) | 3 (2 to 6)
| Low-risk patients | 3%            | 21%            | 86% (62 to 95) | 6 (4 to 9)

*Abbreviations defined in Glossary; RRR, NNT, and CI calculated from data in article.

Commentary

The assumption that early mobilisation and rigorous attention to deep breathing and coughing exercises will benefit patients who have had a major abdominal operation has not been extensively evaluated. When it was evaluated, the results were inconsistent. Therefore, this report by Fagevik Olsen and colleagues is welcome, not only because it evaluates a common tenet of surgical practice, but also because it justifies it. The study showed that pulmonary complications were reduced and oxygen saturations improved when patients received preoperative teaching and a formal course of preoperative and postoperative chest physiotherapy.

One can quibble with the degree of clinical benefit that physiotherapy offers. The definition of a pulmonary complication depends on subjective criteria. There did not appear to be a difference in forced vital capacity, postoperative temperature, peak expiratory flow rate, or postoperative requirements for oxygen support or intensive care. Patients in the study group mobilised earlier, but this probably reflects the fact that mobilisation was part of the physiotherapy program. Nonetheless, even if the magnitude of benefit is much less than it first appears, the risk to the patient of such a program is negligible and the costs almost certainly modest. It is hard to take issue with the authors' recommendation that chest physiotherapy be given to all patients before major abdominal surgery. Whether the specific program used in this study, or an optimal program, cannot be evaluated. Physiotherapy is a simple and sensible intervention, and on the basis of this study I would recommend it for all patients, low or high risk—having elective abdominal surgery.

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