# Letters

## Does hypertension also belong to the patient-related risk factors for incisional hernia?

Professor Richard C Turner excellently highlighted the key aspects of the clinical practice of incisional hernia, including the current diagnosis and management options, providing a useful guideline relevant to the practice of general practitioners (GPs; *AJGP* September 2018).[1] In addition to the aforementioned modifiable patient-related risk factors, such as obesity, diabetes and smoking,[1] I would like to complement another possible risk factor for the development of incisional hernia that GPs should also consider in primary prevention.

In a recent Dutch study by Amelung et al with 318 patients who underwent stoma reversal, a multivariable logistic regression analysis also revealed hypertension as an independent risk factor for the development of incisional hernia at the previous stoma site (odds ratio 2.52, 95% confidence interval [CI]: 1.14, 5.54]; $P = 0.022$).[2] Brook and his team from the Exeter Surgical Health Services Research Unit in the UK recently investigated 193 loop ileostomy reversals, with the intent to predict risk factors for ileostomy site hernia. A higher body mass index (BMI) and a higher blood pressure at preoperative assessment (>140/90 mmHg) were found to be significant predictors of hernia development. The significance of hypertension persisted even in multiple regression, with an increased odds risk of 18.3 ($P = 0.004$), independent of American Society of Anesthesiologists physical status and BMI.[3] Perhaps there is an intrinsic association of systemic hypertension with hernia, for example due to inappropriate activation of inflammatory cytokines, which also reduce proper wound-healing phases (profibrotic functional state change, etc).[2,3]

In a further small retrospective cohort study in which the author was involved with 295 patients who underwent a midline laparotomy at the Royal Hobart Hospital, high BMI, diabetes and also hypertension (hazard ratio 2.17, 95% CI: 1.16, 4.08; $P = 0.016$) were reported as main factors associated with development of incisional hernia on univariable analysis.[4] Especially against this background, the clinical experience of Professor Turner would certainly be interesting for regular *AJGP* readers in this 'hypertensive' aspect. Although further controlled 'blood pressure' research is urgently needed, I think it makes sense for GPs to have heard that even hypertensive patients may experience incisional hernia.[5–8]

Dr Martin Hofmeister
Consumer Centre of the German Federal State of Bavaria, Department of Food and Nutrition, Munich, Germany

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## Reply

Hypertension as a risk factor for the development of incisional hernia is clearly more than just a smoking gun.

I thank Dr Martin Hofmeister for his insightful observations and for citing the studies from the Netherlands[1] and the UK.[2] Both looked at a specific type of incisional hernia that occurred after stoma site closure. Like many studies of surgical outcomes, they were of a retrospective cohort design, with the inherent possibilities of selection and information bias. The Hobart study[3] used similar methodology, but differed in that it looked at midline laparotomies and considered the outcome as time-to-event (diagnosis) rather than a binary variable. The former was felt to be more epistemologically appropriate for demonstrating association in a study with forward directionality and variable follow-up times. The inferences drawn from these studies give impetus to conduct high-quality, multicentre, prospective cohort studies and, in the interim, more systematic reviews and meta-analyses.

In the Hobart study, the effect of hypertension was abrogated when adjusted for body mass index, and the lack of any remaining significant associations was deemed to be due to underpowering.[3] It was thus inferred that the apparent effect of hypertension was probably mediated by obesity. Surgeons tend to assume that obesity gives rise to abdominal wound failure because of the technical difficulties encountered when closing the incision, or alternatively because of the raised intra-abdominal pressure engendered by excess perivisceral fat. However, it may also be mediated by the inflammatory mediators known to be secreted by adipocytes.[4] The presence of these inflammatory mediators in hypertensive patients, as rightly noted by Dr Hofmeister, could be as much a cause as an effect.[5]

In the end, it seems that more than one interdependent metabolic risk factor contributes to incisional hernias following abdominal surgery and to their recurrence following repair. All merit mitigation as part of a holistic chronic disease management strategy in the primary care setting. As higher level evidence emerges to implicate hypertension per se in the development of incisional hernia, this should certainly be added to the list of justifications for its treatment.

Prof Richard C Turner
University of Tasmania/ Hobart Clinical School, Hobart, Tasmania

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