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In conclusion, MRGPRX2-mediated allergic reactions to rocuronium may exist in a small number of cases. In making this diagnosis, we need to re-examine our testing methods by focusing on the mode of exocytosis. In particular, future studies should focus on measuring histamine release directly rather than relying on indirect measures, such as β -hexosaminidase and tryptase secretion. This is because the allergic reaction caused by rocuronium stimulation of MRGPRX2 might not involve complete exocytosis; rather, histamine release by a kiss-and-run mechanism may play an important role.

Funding

Y.S. was supported by the Japan Society for the Promotion of Science (JSPS), Grants-in-Aid for Scientific Research KAKENHI grant number 18K16541, and the Japan Society of Anesthesiologist (JSA) Pitch Contest 2017.

Declarations of interest

The authors declare that they have no conflicts of interest.

Acknowledgements

The authors thank the Edanz group (<https://en-author-services.edanz.com/ac>) for editing a draft of this paper.

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doi: 10.1016/j.bja.2021.04.009

Advance Access Publication Date: 13 May 2021

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Mindfulness for patients undergoing surgery: a cost-effective and potentially underrated tool for improving outcomes

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Keywords: analgesia; anxiety; eHealth; mindfulness; pain; surgery

Editor—The COVID-19 pandemic has resulted in the cancellation of scores of elective operations, and even the postponement of urgent cancer surgery. This has no doubt contributed to patient anxiety, an understandable and natural emotion encountered by surgical patients in the best of circumstances. Many patients may have underlying anxiety and depression and this is compounded by the stress associated with having to undergo either elective or emergency surgery. This can be even more severe if the patient develops a complication.

Mindfulness, defined on the NHS website as ‘knowing directly what is going on inside and outside ourselves, moment by moment’,¹ is not usually considered as part of the management of the surgical patient, nor in Enhanced Recovery After Surgery (ERAS) programmes. There is a wealth of Level I evidence that illustrates the ability of mindfulness to improve symptoms of anxiety and depression; it is now combined with cognitive behavioural therapy (CBT) and offered routinely to all young patients presenting with mild depression.^{2,3} Its evidence base as a treatment option for patients with somatic and chronic diseases is also convincing in improving the psychological wellbeing and quality of life for patients with irritable bowel syndrome, chronic fatigue syndrome, cancer, chronic pain, and hypertension⁴ when delivered through eHealth interventions.⁵ No such evidence base currently exists for its application in surgery, but the authors believe it does have potential utility.

Individual mindfulness sessions may differ according to each coach’s individual practice. There are, however, common core techniques:

Meditation: This forms the bedrock of mindfulness, and brings patients’ awareness to themselves, others, and their environments. Once clients have a regular meditation practice, they will start to notice how it acts as a ‘reset’ button for the mind and their wellbeing as a whole.

Awareness: Witnessing and noticing.

Acceptance, freedom, and choice: Patients may struggle with stress or a situation, which may be prolonged without acceptance. This involves patients taking charge of their lives, understanding what is important to them, and what they want to change.

Breathing techniques: Regulation of stress and achieving calm. Slowing and controlling breathing with focused awareness can bring patients back to equanimity.

A ‘body scan’ exercise may be used to increase awareness of physiological sensations and help to ground patients in the here and now.

‘The observer’ technique enables patients to ‘watch’ their thoughts but not overly identify with them.

Higher preoperative pain catastrophising scores have been linked to higher postoperative pain scores and opioid use, all of which mindfulness techniques have been shown to taper.⁶ Patients in pain are more likely to require addictive pharmacological interventions with a significant side-effect profile that requires concomitant antiemetic and laxative prescriptions, and longer inpatient stays contributing to cost

burden. Any reduction in inpatient stay is likely to pay dividends and points towards the potential cost-effectiveness of mindfulness.

Unaddressed preoperative anxiety and depression have been linked to more than just pain scores, affecting postoperative nausea, agitation, and even increased time of intubation and sensorineural deficit.⁷ Until recently, it was not uncommon to use anxiolytics in the UK as part of the ‘pre-med’, which have resulted in less postoperative anxiety and actually fewer surgical-site infections.⁸ Further research is needed to assess whether non-pharmacological interventions, such as mindfulness, may replicate or surpass these improvements in outcomes or may prove to serve as a useful adjunct to anxiolytic medication used in the preoperative period.

Timing and delivery of therapy designed to address anxiety is important. It will be no surprise to clinicians that patient anxiety levels in the afternoon before the day of surgery correlate with postoperative anxiety. However, it should be noted that preoperative anxiety very often peaks before the patient’s admission and only a small percentage of patients may reach their peak anxiety levels on the day of surgery.⁹ In-hospital preoperative counselling, regardless of the ability of the clinician, may therefore be less effective. This is of great relevance now given the restrictions on hospital attendance imposed for infection control reasons during the pandemic. Mindfulness, being patient-led and deliverable either face to face with a professional coach or through eHealth interventions well before a patient is admitted to hospital for their surgery, may be uniquely placed to address this issue. Sessions can continue into the postoperative period and can be shaped to address novel anxieties that might arise then.

For mindfulness to be delivered by the NHS, it would most likely require some form of standardisation, which is beyond the scope of this correspondence. Barriers to successful implementation of mindfulness may reside in its delivery. In-person one-to-one sessions may be financially unviable for trusts, while app-based or online delivery would require an initial investment in technology. Without definitive data on patient outcomes and hospital length of stay, healthcare policy makers may be averse to this investment. In the event that it is delivered electronically, there may be patients with poor access to technology who may be disadvantaged. Provisions for those who do not have or cannot effectively operate a smartphone should be considered. As such, the tech-savvy patient who buys into mindfulness is likely to benefit the most.

More systematic research is clearly needed to impartially assess its efficacy in the surgical patient, but we hope this selection of research might serve to involve mindfulness in anaesthesiology.

Declarations of interest

The authors declare that they have no conflicts of interest.

Funding

No funding received.

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doi: 10.1016/j.bja.2021.03.038

Advance Access Publication Date: 21 May 2021

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Perioperative fluid management and patient outcomes. Comment on *Br J Anaesth* 2021; 126: 720–9

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Keywords: complications; fluid management; goal-directed fluid therapy; haemodynamics; perioperative outcomes

Editor—The large multicentre trial performed by Miller and colleagues¹ is of very limited assistance in clinical decision-making. The authors report on complications associated with different perioperative intravenous fluid volumes (restrictive or liberal), but do not address the dependence of fluid volumes on physiological and haemodynamic factors. The data provide no information on how much fluid the individual patients really needed for optimal fluid replacement, which must be the ultimate goal. Fluid requirement depends on temperature, age, intravascular volume, heart function, and body mass. No surrogates of adequate oxygen delivery, extraction, or both were mentioned in the report. Neither the quantity nor the type of fluid loss, nor postoperative oral fluid uptake was addressed.

Crystalloids must be regarded as potentially harmful drugs with inherent side-effects. Despite their low cost and

widespread availability, crystalloids reduce osmotic pressure because of serum dilution. According to the Starling law of fluid movement across capillary borders, water will accumulate in the extravascular space, causing tissue oedema and detrimental effects at the cellular and organ levels. The observed rates of respiratory and renal complications in some patients may be associated with this undesirable fluid flux.

Decisions concerning optimal intravenous fluid replacement are complex and must be derived from patient- and procedure-specific factors. Modern fluid management should follow the concept of goal-directed therapy, targeting a meaningful and measurable clinical variable^{2,3} instead of the traditional and more static approach of predicting the need for fluids without actual measurement. There is an absence of standardisation, and some treatments might even aggravate the situation.⁴

It would not be justified to conclude that all patients in Q1 and Q5 received inadequate volumes; some Q3 patients may