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Medical Care for Humans in Space (3)

Author: Dr. Rowena Christiansen
University of Melbourne, Australia, rowena.christiansen@unimelb.edu.au

“FRIEND OR FOE”? IS MY APPENDIX USEFUL, AND SHOULD I TAKE IT WITH ME IF I’M
GOING TO MARS?

Abstract

INTRODUCTION: Traditional belief holds that the human appendix is a vestigial organ devoid of any purpose, and consequently, surgical appendectomy has been the “gold standard” treatment for suspected appendicitis. Prophylactic (preventative) appendectomy remains the policy of the Australian Antarctic Division for wintering medical practitioners and has been discussed in the context of long-duration non-orbital space flight but is currently not NASA policy.

AIM: New research around appendiceal function, increasing adoption of non-surgical treatment modalities for acute appendicitis, and emerging research on the long-term consequences of appendectomy have recently enabled researchers to challenge this paradigm and consider a risk-benefit analysis.

METHODS: This novel project set out to test the hypothesis that a “one size fits all” prophylactic appendectomy policy may not be in the best interest of individual expeditioners, and utilised a “mindmap” to identify several key areas for a scoping literature review. This enabled disparate research to be drawn together in an innovative way.

RESULTS: A growing body of research has discovered that the appendix plays an important role in the gut immune system and maintaining gut health. It acts as a reservoir of good bacteria that repopulates the gut after pathogenic challenge. This is particularly important for people with impaired immune systems, such as those that occur in extreme environments. Appendicitis can often be successfully treated with intravenous antibiotics, and recent studies have also included oral antibiotics. Prophylactic appendectomy is not without risk, as 1:4 to 1:3 people will encounter some sort of postoperative complication. After an appendectomy, there is an increased risk of many serious medical conditions, including intra-abdominal adhesions, ischaemic heart disease, inflammatory and irritable bowel diseases, rheumatoid arthritis, and many others. The risk of adhesions is life-long, which represents an ongoing risk for space exploration.

DISCUSSION: The increased morbidity and mortality associated with appendectomy is costly for individuals (the burden of disease) and society (health economics). It also poses a currently unappreciated health risk for long-term off-world expeditions.

FUTURE APPLICATIONS: As well as the potential to apply this research in expeditionary and long-duration spaceflight contexts, it also has translational potential to change health practices here on Earth and provide individuals with choices if they are suspected of having acute appendicitis. Future directions for research include the role of gut bacteria profiles and diet in prevention and prophylaxis, and refining diagnostic techniques, including the application of emerging imaging techniques such as electrical impedance tomography.