Risk and Pathogenesis of Dysphagia Related to Antireflux Surgery

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Associate Diploma Medical Laboratory Science
Bachelor of Science

A thesis presented for the degree of
Doctor of Philosophy

Discipline of Surgery, Faculty of Health Sciences, University of Adelaide, South Australia

February 2016
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Dysphagia Related to Antireflux Surgery

Dysphagia, the difficulty of swallowing food or drink, is experienced by some patients with gastro-oesophageal reflux disease and is a common adverse effect of antireflux surgery, a procedure involving diaphragmatic hiatal repair and fundoplication. Dysphagia after surgery in the absence of recognisable anatomical abnormalities is poorly understood and thus difficult to treat. Despite modifications to surgical techniques, post-operative dysphagia remains unpredictable (Chapter 1). My aim is to identify patients at risk and the causes of dysphagia related to antireflux surgery.

A fundamental premise of this thesis is that objective measurements hold the key to understanding post-fundoplication dysphagia. Five prospective studies are presented which evaluate oesophageal body or oesophago-gastric junction (OGJ) function with regards to: early new-onset and late persistent post-operative dysphagia. Objective data were gathered using: i) luminal manometry alone; ii) impedance combined with manometry, to assess relationships between oesophageal pressure and bolus flow; and iii) three-dimensional pressure recordings of expiratory and inspiratory radial OGJ pressure to assess the contribution of hiatal repair and fundoplication to post-operative dysphagia.

These studies show: an ‘oesophageal ileus’ in the early post-operative period, with global failure of primary peristalsis in 70% of patients after total fundoplication, compared with 20% of patients after cholecystectomy. Oesophageal ileus is transient with subsequent return of pre-operative motility patterns (Chapter 2). Of all patients undergoing laparoscopic antireflux surgery in the Unit (tertiary care hospital), the incidence of late revisional surgery is low at 5.6%, including 3% for persistent dysphagia. Dysphagia is the most common indication for revisional surgery, albeit with lower patient satisfaction with outcome than revisional surgery for recurrent reflux (Chapter 3).
In addition, flawed interaction between oesophageal and OGJ function is implicated in dysphagia. OGJ resistance to outflow is associated with dysphagia when there is sub-optimal distal oesophageal contractile strength and relatively high OGJ relaxation pressure on swallowing (Chapter 4). Limited tools for impedance-manometry data analysis inspired the conceptualisation and development of new automated combined pressure-flow analysis, achieved through scientific collaboration. This novel approach revealed for the first time that some patients have a pre-existing, asymptomatic, subtle variation of viscous bolus compression and movement in relation to oesophageal peristalsis that increases the risk of new-onset post-operative dysphagia (Chapter 5).

Fundoplication and hiatal repair alter OGJ anatomy to prevent reflux. However, after surgery, aberrant asymmetry of radial OGJ pressure during inspiration is associated with persistent dysphagia, consistent with a focally restrictive diaphragmatic hiatus from crural repair (Chapter 6).

In conclusion, oesophageal ileus in the early post-operative period is transient and the rate of late revisional surgery for troublesome dysphagia is low. Post-surgical dysphagia is related to a pre-existing pattern of sub-optimal bolus transport; and after surgery, inadequate modulation of oesophageal function in response to altered OGJ function. When antireflux surgery results in abnormally skewed OGJ pressures, dysphagia may be due to a ‘snug’ hiatal repair. Future studies hold promise for a reduction in post-surgical dysphagia through examination of local intrinsic modulation of swallowing function and development of objective calibration of hiatal repair.
THESIS DECLARATION

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Jennifer C Myers and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference had been made in the text.

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- Published by John Wiley & Sons Ltd for © International Society for Diseases of the Esophagus (Online ISSN 1442-2050). The original publication doi: http://dx.doi.org/10.1111/j.1442-2050.2007.00643.x is available at Diseases of the Esophagus, electronic link: http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1442-2050


- Published by John Wiley & Sons Ltd for © British Journal of Surgery Society Ltd (Online ISSN 1365-2168). The original publication doi: http://dx.doi.org/10.1002/bjs.6486 is available at www.bjs.co.uk, electronic link: http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1365-2168


- Published by Springer-Verlag New York © Springer International Publishing AG, Part of Springer Science+Business Media (Print ISSN 1091-255X; Online ISSN 1873-4626). The original publication doi: http://dx.doi.org/10.1007/s11605-011-1675-7 is available at electronic link: http://link.springer.com/journal/11605


- Published by Wiley, Chichester, West Sussex UK © John Wiley & Sons Ltd (Online ISSN 1365-2982). The original publication doi: http://dx.doi.org/10.1111/j.1365-2982.2012.01938.x is available at electronic link: http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1365-2982

ACKNOWLEDGEMENTS

The research ideas and scientific studies presented in this thesis were conceived out of my interaction with patients and clinicians in my role as a medical scientist in Oesophageal Function at the Royal Adelaide Hospital. I am most thankful to the many patients who enabled me to journey with them and for allowing me to undertake novel invasive investigations for this research.

I thank my supervisors Professor Glyn Jamieson, Professor John Dent and Professor David Watson for their guidance. I am grateful for their intellectual, practical and moral support. Their affirming words about my ideas for exploration gave me the courage and commitment to pursue them. I appreciated their ‘open door’ and ‘listening ear’ when I was trying to manage setbacks and limitations such as equipment problems, staff shortages and delayed surgery dates. I thank the Dean of Graduate Studies for approving intermissions while I covered for co-workers on maternity leave. I thank Professor Jamieson for encouraging me to present at scientific meetings and for making it possible to do so. I am most grateful to Professor Dent for our regular, engaging discussions and for his tireless editorial advice.

Juggling full-time employment while undertaking part-time higher degree studies has brought many blessings and challenges, which could not have been embraced without the sustained support of my friends, family, colleagues and collaborators. I especially thank my friends Michael Ledda, Adriana Celani and Mathew Bazeley for being with me for every step of the way. I am deeply grateful to my family Margaret & Wally, Maria, Chris, Kathy and Louise for their unwavering support. I have appreciated our togetherness while embracing life’s ebbs & flows and ‘roller coaster rides’ during this period, for indeed ‘life happens when you’re on your way to someplace else’ or finishing a degree! I am indebted to Neville De Young for helping me with the ‘juggling act’, for lowering the administrative burden pertaining to my studies and work, and for urging me to present my research at meetings often. I am most thankful to all my collaborators for one of the lasting gifts of this journey, that of enjoying good collaboration, and the energy and momentum that follows. I especially thank Taher Omari for so readily offering to develop software, when I had data and ideas but not the skill-set to develop analysis algorithms.

Lastly, I want to acknowledge the research environment that I was fortunate to be a part of. The interaction between staff, students and overseas fellows along with ‘corridor conversations’ created a great atmosphere for nurturing research. Departmental presentations were good for growing ideas and bringing collective experience and wisdom to each study. Some interactions were surprising: at the end of one face-to-face discussion, a Visiting Nimmo Professor said “I don’t want to take the wind out of your sails for I can see you have ideas and passion for your given topic, but researching dysphagia will be a bit like trying to find the holy grail!” Well, I was startled, but in hindsight, thanks for spurring me on!
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>3-D</td>
<td>Three-dimensional</td>
</tr>
<tr>
<td>AGA</td>
<td>American Gastroenterological Association</td>
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<tr>
<td>AIM</td>
<td>Automated impedance manometry</td>
</tr>
<tr>
<td>CFV</td>
<td>Contractile front velocity</td>
</tr>
<tr>
<td>DCI</td>
<td>Distal contractile integral</td>
</tr>
<tr>
<td>DRI</td>
<td>Dysphagia risk index</td>
</tr>
<tr>
<td>EAES</td>
<td>European Association of Endoscopic Surgery</td>
</tr>
<tr>
<td>Fr.</td>
<td>French size (external diameter) of the French gauge system</td>
</tr>
<tr>
<td>HRIM</td>
<td>High-resolution impedance manometry</td>
</tr>
<tr>
<td>HRM</td>
<td>High-resolution manometry</td>
</tr>
<tr>
<td>IBP</td>
<td>Intrabolus (or ramp) pressure</td>
</tr>
<tr>
<td>IQR</td>
<td>Interquartile range</td>
</tr>
<tr>
<td>IRP</td>
<td>Integrated relaxation pressure</td>
</tr>
<tr>
<td>LOS</td>
<td>Lower oesophageal sphincter</td>
</tr>
<tr>
<td>MCT</td>
<td>Multi-centred randomised trial</td>
</tr>
<tr>
<td>OGJ</td>
<td>Oesophago-gastric junction</td>
</tr>
<tr>
<td>PPI</td>
<td>Proton pump inhibitor</td>
</tr>
<tr>
<td>QoL</td>
<td>Quality of life</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomised controlled trial</td>
</tr>
<tr>
<td>TGA</td>
<td>Therapeutic Goods Administration (Australia)</td>
</tr>
<tr>
<td>TLOSR</td>
<td>Transient lower oesophageal sphincter relaxation</td>
</tr>
<tr>
<td>US-FDA</td>
<td>Food and Drug Administration, U.S.A.</td>
</tr>
<tr>
<td>VAS</td>
<td>Visual analogue scale</td>
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