

THE ROLE OF SURGERY AND DISEASE LOAD IN REFRACTORY CHRONIC RHINOSINUSITIS

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Ahmed M. A. Bassiouni

MBBCh

Department of Surgery – Otolaryngology, Head & Neck Surgery, University of Adelaide

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Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Ahmed Bassiouni

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Thesis Abstract

Chronic rhinosinusitis (CRS) is chronic inflammation of the sinonasal mucosa. It is a disease of significant impact on public health, one that affects about 10-15% of the population. Functional Endoscopic Sinus Surgery (FESS) is the “gold standard” surgical treatment for CRS; its original philosophy or concepts are based upon the sinonasal mucociliary clearance studies by Messerklinger and Stammberger, which emphasize the role of the osteo-meatal complex (OMC). However, although the success rate of FESS is about 90%, there is a subgroup of patients who exhibit no improvement, and thus require repeated surgeries. This subgroup of patients suffers from refractory chronic rhinosinusitis (rCRS), which is the main focus of this thesis. In this thesis the current understanding of the pathogenesis and causes of surgical failure in CRS are reviewed. This thesis presents the hypothesis that our understanding of the pathogenesis of CRS has advanced since the original concepts of FESS were put forward, and that patients who develop rCRS have other pathogenic features that cannot be addressed by these concepts. We revisit middle turbinate lateralization (MTL) as a surgery-related factor of rCRS in Chapter 6, and we pose the question: Is MTL a complication associated with worse surgical outcomes, or just a harmless sequela, of the surgical destabilization of the middle turbinate during sinus surgery? Our findings show that MTL plays a role in surgical failure and requiring revision surgery, but suggest that the clinical significance of MTL may be related to frontal sinus obstruction and not necessarily to the OMC. We then present two novel hypotheses: the inflammatory load hypothesis in Chapter 7, and the irreversible disease hypothesis in Chapter 8. In Chapter 9, we investigate nasal polyp recurrence in CRS with Nasal Polyposis (CRSwNP) as an important cause of rCRS. We study the patterns of polyp recurrence and the clinical factors associated with more aggressive recurrence. The findings show that firstly, comorbid factors such as asthma and aspirin sensitivity contribute to the disease load and rCRS; and secondly, that more aggressive surgical removal of that disease load and maximal opening of the sinuses through a frontal drillout procedure improve the surgical outcome and disease control for these rCRS patients. We then proceed to investigate the relevance of our two novel hypotheses to refractory CRSwNP through a histopathological study in Chapter 10. We also describe the evolution of the inflammatory load in patients with rCRS from first to second surgery, a topic rarely addressed in the literature. We found that a higher inflammatory load is present in patients

who fail surgery and go on to develop refractory CRS, when compared to patients who respond to surgery, with a particular significance to the eosinophilic load. In summary, our findings suggest that the inflammatory load is associated with long-term surgical outcomes. The recommendation based upon findings in this thesis is that surgery offered for CRS should be viewed as a tool for addressing and controlling disease load, and not just for the conservative clearance of disease of the OMC.

Publications arising from this thesis

Bassiouni A, Wormald P-J. Airway remodeling in chronic rhinosinusitis. Global Atlas of allergic rhinitis and chronic rhinosinusitis. Cezmi A, Hellings P, Agache I, editors. European Academy of Allergy and Clinical Immunology; 2015 Jun.

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