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Age-Related Sarcopaenia of the Posterior Pharynx in a Cadaveric Population

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A Dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand,

In fulfilment of the requirements for the degree of

Masters of Science in Medicine (Internal Medicine) by dissertation

Student number: 601936

Supervisor: Prof. S. Maharaj

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ABSTRACT

Background

Sarcopaenia is the loss of muscle associated with ageing. Dysphagia is a disruption in the correct functionality of the pharyngeal muscles with significant implications.

Objective

To investigate the degree of Sarcopaenia in the posterior pharynx in a cadaveric population and its correlation with age at the time of death and sex as a possible contributing factor leading to the development of dysphagia.

Methods

Retrospective review of data collected from 109 cadavers was analysed, 52 males and 57 females. A total of 86 cadavers met the inclusion criteria, 42 males and 44 females. Mean measurements at four aspects of the posterior laryngopharynx at the level of the inferior pharyngeal constrictor were analysed and correlated with age. These means were further compared in cadavers 65 years and younger, and those older than 65 years. This mean was also compared between the two sexes. A paired student's T test and a one sample T test were used to test for significance.

Results

A positive correlation was found between age and the mean of the muscle thicknesses of the posterior laryngopharynx. A significant difference was found between the groups of cadavers divided between those 65 years and younger and older than 65 years. No significant difference was found between the muscle thickness of the posterior laryngopharynx and sex of the cadaver.

Conclusion

There was a positive correlation between age and the mean muscle thickness of the posterior laryngopharynx. Showing that the muscle is thicker in older cadavers. Furthermore, the muscle thickness is significantly thicker in those more than 65 years than those 65 years and less.

It has been shown by multiple previous studies that have shown that constriction of the pharynx appears to decline with age. Other studies have however shown that the force generated during swallowing in the pharynx does appear to increase with age. This has been postulated to be a compensatory response to the decrease in compliance of the cricopharyngeus muscle, as the upper oesophageal constrictor (UES), due to a replacement of normal muscle and connective by fibroadipose tissue.

As a part of sarcopaenia where there is a complex interplay between atrophy and hypertrophy, hypertrophy appears to be the most prominent feature in the posterior laryngopharynx of the elderly as is demonstrated by a thicker muscle layer in our older individuals. This hypertrophy may be a compensatory effect due to the loss of muscle fibres due to atrophy as has been previously explored by other authors. There appears to be no statistically significant difference in this muscle thickness between sexes.

This hypertrophy may be a compensatory effect due to the loss of muscle fibres due to atrophy as has been previously explored by other authors. This may also be a possible reason to explain the increase in the force of contraction during swallowing to overcome the resistance that a food bolus requires to overcome the resistance within the UES, which has been shown to be less compliant in aged individuals, in order to pass into the proximal oesophagus.

Research on cadaveric Material covered under School of anatomical sciences Ethics Waiver ref: W-CJ-140604-1, Human Research Ethics Committee

Human Research Ethics Committee (Medical)

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07 October 2016

TO WHOM IT MAY CONCERN:

This certifies that the following research does not require clearance from the Human Research Ethics Committee (Medical).

Investigator: Nicolas Fitchat – "Why Do Zenker's Diverticulae occur more on the Left than the Right?" School of Anatomical Sciences (Head: Prof M Steyn - Previously Prof T J M Daly, initial approval 04/06/2014 – recertified 27/01/2016).

Project title: Research on Cadaveric Material covered under School of Anatomical Sciences Ethics Waiver Ref: W-CJ-140604-1 (Prof M Steyn)

Reason: In terms of Chapter 8, sections 62-64 of the National Health Act No 61 of 2003 donated bodies and their tissues may be used for, among other purposes, health, and research. Use of such Material is subject only to permission from the responsible person in the School of Anatomical Sciences – the Head or person designed by the Head.

Professor Peter Cleaton-Jones

Chair: Human Research Ethics Committee (Medical)

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07 OCT 2016
RESEARCH OFFICE HREC (Medical)
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Copy - HREC (Medical) Secretariat: Rhulani Mkansi, Zanele Ndlovu.

Declaration of Amendment to Original Research Project in the Collections of the School of Anatomical Sciences

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Declaration of Amendment to Original Research Project in the Collections of the School of Anatomical Sciences

Researcher name: Dr Nicolas Fitchat

Student/Staff number: 601936

Affiliation/s: Department of Otorhinolaryngology and Head and Neck Surgery

Supervisors/Collaborators: Dr Shivesh Maharaj

Original Project title: Why do Zenker's Diverticulae occur more on the Left than the Right?

Original Date of Approval: 14 October 2016

I, the undersigned, **Dr Nicolas Fitchat** acknowledge that I will not expand the research project approved on the aforementioned date beyond the scope covered in the previously submitted proposal and the amendments motivated below, except under the confirmation of another letter of amendment to the original project as this.
Expanding the research project beyond the scopes of the original proposal and any previous approved letters of amendment without consulting the Chair of the Collections Committee or Head of School, is strictly prohibited.

Amendments and motivation, thereof:
The muscle thicknesses of the posterior pharynx were measured in 110 cadavers in 2016 and 2017. This along with demographic data (Age, Sex and Length) were recorded and tabulated to determine the reason as to Zenker's Diverticulae occur more on the Left than the Right Side, as well as to look for a predisposition in male, longer and older cadavers. The proposed amendment would be to use the same data already collected from this study conducted in 2016 and 2017 in order to explore sarcopaenia of the posterior pharynx in a cadaveric population and how it is related to the cadavers' age and sex. This new study conducted on data already collected from the previous study will be used as part of an MSc (Med) by dissertation. As the data already collected in 2016 and 2017 already has the muscle thicknesses of the posterior pharynx and the sex and age of each cadaver recorded, it would therefore be appropriate and relevant to use the same data collected for this new proposed study.

Signature: _____ Date 25/02/2020
Researcher

Signature: _____ Date _____
Chair of Collections Committee or Head of School

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