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D.S. ROSENGARTEN
SURGICAL TRAINEE RESEARCH PRIZE 2022

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ABSTRACT BOOKLET

Chair

Associate Professor James Lee

D.S. ROSENGARTEN
SURGICAL TRAINEE RESEARCH PRIZE 2022

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MR DAVID SAM ROSENGARTEN

The D.S. Rosengarten Surgical Trainee Research is named in honour of David Rosengarten. David learnt his surgery at the Alfred Hospital before undertaking research and Post-Fellowship training in Vascular Surgery at the Royal Postgraduate Medical School, Hammersmith. He returned to the Alfred and held appointments in the Department of Surgery and the Vascular Unit. David was appointed Head of the Vascular Surgery Unit at the Alfred in 1987, the position he held until his sudden death in 1994. David was recognised for his encouragement of research, for an enduring interest in surgical audit and his involvement in registrar training. This prize is his enduring memorial.

Presenter 1 – Wilson Yang

INCREASED RISK OF OESOPHAGEAL CANCER IN BARIATRIC SURGICAL PATIENTS COMPARED TO POPULATION NORMS AND AN OBESITY-MATCHED AUSTRALIAN POPULATION: A 20 YEAR COHORT STUDY OF 11,595 PATIENTS

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Background and Aims:

Obesity is a known risk factor for oesophageal cancer. Bariatric surgery achieves effective weight loss and improves health but may worsen reflux symptoms, potentially increasing the risk of oesophageal cancer in already predisposed patients. We aim to identify the incidence of oesophageal cancer in our cohort of bariatric surgical patients and compare this to Australian norms and obesity-matched population dataset.

Methods:

A prospectively collected database identified patients who underwent bariatric surgery and subsequently diagnosed with oesophageal cancer. General and obesity-matched population dataset were obtained from AIHW and WCRF meta-analyses. Relative risk was calculated using the standardized incidence ratio (SIR). Clinical variables including surgery technique, presenting symptoms and outcomes were collected.

Results:

We identified 11,595 patients who underwent bariatric surgery with a total 76,376.8 person-years at risk. There were 16 cases of oesophageal cancer after bariatric surgery, mean age 58.8 and mean BMI of 37.4 kg/m^2 at cancer diagnosis. The SIR for oesophageal cancer was 1.89 (95% CI:0.96-3.25) and 6.70 (95% CI:3.46-11.71) when compared against general and obesity-matched dataset respectively. Majority had undergone LAGB insertion (86%). There was a mean BMI reduction of 11.1 kg/m^2 and mean duration between surgery and cancer diagnosis of 9.8 years. The most common presenting symptoms were progressive dysphagia (31%) and reflux (22%). Four patients underwent curative surgical resection, but all had associated post-operative complications (2 CD-II, 1 CD-IIIb, 1 CD-IVb).

Conclusions:

Bariatric surgical patients appear to have increased risk of developing oesophageal cancer compared with both general and obesity-matched Australian population. Careful evaluation or endoscopy when there are concerning symptoms is required to avoid delayed diagnosis. Given the lag time between surgery and cancer diagnosis, regular endoscopic surveillance may be indicated.

Presenter 2 – Yit Leang

Evaluation of upper gastrointestinal (GI) surgical complications requiring inter-hospital transfer to a tertiary upper GI Unit: Are we adequately auditing outcomes and recognising opportunities for improvements in quality?

Yit J Leang[1,2], Richard Chen[1,2], Kalai Shaw[1], Wendy Brown[1,2], Paul Burton[1,2]

Affiliations:

1. Oesophago-gastric and Bariatric Surgical Unit, The Alfred Hospital, Melbourne, Australia
2. Department of Surgery, Central Clinical School, Monash University, Melbourne, Australia

Background

Complications in bariatric surgery represents a major source of patient morbidity. It is suspected that management of major bariatric complications frequently occurs at a secondary institution, creating a risk that outcomes are not adequately audited or reviewed. Our aim was to evaluate the nature of these complications managed at a major tertiary upper gastrointestinal (GI) unit and provide insight to the health resource consumption and prevention strategies.

Methods

A retrospective review of all patients managed under the upper GI unit with bariatric complications transferred from an external hospital between year 2014 to 2021. Each case was assessed by 2 blinded surgeon reviewers using the Victorian audit of surgical mortality (VASM) framework modified for this study. Inter-rater reliability assessed using Cohen's weighted Kappa.

Results

A total of 73 patients (15 males, 58 females) were included for analysis. Mean age was 45.1 $\pm$ 13.2 years and mean BMI was 42.8 $\pm$ 8.2 kg/m^2. The most common complication managed was staple line leak post sleeve gastrectomy (44%). The median cost accrued to care for these patients was $23,930 (minimum $1,762, maximum $731,231). Fifty-three percent of the complications were Clavien-Dindo Grade 3 and beyond. Twenty six percent (19/73) of cases were deemed preventable by both surgeon assessors (Kappa 0.57, p <0.001). Fifty percent (37/73) of the principal cause of complication was attributed to human error (Kappa 0.59, p <0.001). Seventy-eight percent of cases were not reviewed at the index institution's surgical audit.

Conclusion

Bariatric surgical complications are highly morbid and consumes huge resources. These are hypothetically avoidable, and management does occur at secondary institutions. The transfer of care to and lack of surgical audit highlights an important loss of opportunity for surgical teams to reflect and further improve quality of surgical care.

Presenter 3 – Kaleb Lourensz

Title: The role of peristalsis in gastric conduit emptying

Authors:
Kaleb Lourensz
Julie Playfair
Yazmin Johari
Shalini Bigwood
Paul Beech
Wendy Brown
Paul Burton

Word count: 274 words

Background & Aims: Optimising gastric conduit emptying post oesophagectomy is key to improving outcomes in a growing cohort of patients with increasingly long survivorship. Peristalsis of the conduit is thought to recover over time, with wider conduits recovering to a greater degree. The relationship between peristalsis and conduit emptying has not been established. We aim to use dynamic high-fidelity MRI to measure conduit peristalsis and assess its correlation with conduit size and emptying.

Methods: Twelve patients greater than 1-year post oesophagectomy and gastric conduit reconstruction were prospectively recruited. Static and Dynamic MRIs were performed in the supine position after consumption of a semisolid meal. Speed, length, and amplitude of peristaltic waves were measured at 4 time points over a 20-minute period. Gastric Motility Index (GMI) was calculated (Velocity x maximal amplitude of peristaltic wave). Volume of the gastric conduit was calculated at the beginning and end of the scanning period.

Results: MRI was performed on 12 patients at a mean 4.7 (SD 2.7) years post oesophagectomy. Two patients had no appreciable peristalsis, and GMI was unable to be calculated. There was no significant change to mean GMI mm^2/s at 5,11,17 or 23 minutes (51.2 SD 41.0, 47.1 SD 47.5, 42.3 SD 25.6, 39.7 SD 23.0 respectively p=0.765) during the 20-minute scanning period post ingestion of the meal. Patients with smaller conduits (<500mls)

demonstrated a nonsignificant trend to increased peristalsis and decreased emptying, compared with conduits >500mls.

Conclusion: Conduit peristalsis, whilst present, does not appear to be a significant factor in influencing conduit emptying. Other factors, such as anatomical alignment and posture related drainage may be of greater importance in mediating effective conduit emptying.

Presenter 4 – Yazmin Johari

Title: Pseudo-columnarisation of the lower oesophagus following sleeve gastrectomy: A validation study

Introduction

The description of endoscopic changes post sleeve gastrectomy (SG) is not well-defined and the diagnosis of Barrett oesophagus (BO) may post a challenge.

Aim

To define and validate the appearance of the gastro-esophageal junction (GOJ) post-SG.

Methods

Retrospective review of histology from mucosal biopsies of post-SG patients with altered appearance of the distal tubular esophagus (N=55). Fifteen patients with characteristic cardiac effacement and pseudo-columnarisation of the tubular esophagus prospectively underwent high-resolution manometry (HRM).

Results

Demographic of all patients: Age 49.5±11.2 years, pre-op body mass index 44.3±6.4kg/m^2, excess weight loss 68.1±36.8%. Median time post-SG was 15.2 months (IQR 14.5). Twelve had BO but 39 (70.8%) had glandular-type gastric mucosa. HRM demonstrated a high concordance between the endoscopic appearance and HRM [median hiatus hernia size 3cm (range 2-3cm) vs. 3.2cm (0-4.1cm), *p=0.168*]. Reduced lower oesophageal sphincter (LOS) basal tone (median 3.78mmHg) and frequent isobaric intraluminal pressurisations were seen between the separation of LOS and diaphragm [peak isobaric supra-diaphragmatic intra-gastric pressure median 23.2 mmHg (range 6.3 – 33.46 mmHg)].

Conclusion

Pseudo-columnarisation of the tubular esophagus is a common occurrence post-SG and can easily be misidentified as BO. Proper diagnosis of Barrett's esophagus is of utmost important post-SG, therefore accurate description of the GOJ and the use of synoptic reporting are essential.

Presenter 5 – Swetha Prabhakaran

Title: Predictive Factors for Anastomotic Leak in Colorectal Surgery: A Bi-National Database Study

Background and Aims

Anastomotic leak (AL) is a serious complication following colorectal surgery. This study aimed to identify factors associated with the development of AL and analyse its impact on survival.

Methods

All consecutive adult colorectal cancer resections with curative intent and anastomosis formation were included from a prospectively maintained bi-national database between 2007 and 2020. The primary outcome measure was the rate of AL. The secondary outcome measure was 5-year overall survival (OS).

Results

There were 7566 eligible patients. The rate of AL was 2.3% and 4.4% in patients with colon and rectal cancer respectively. AL was a significant independent predictor of reduced 5-year OS in patients who underwent curative surgery for rectal cancer (Odds ratio 1.999, $p = 0.017$). Emergency surgery ($p = 0.013$), surgery at a public hospital ($p < 0.01$), and an open surgical approach ($p = 0.002$) were all significantly associated with a higher risk of AL in patients with colon cancer, with higher rates of AL noted in left colectomies as compared to right hemicolectomies (6.8% vs 1.6%, $p < 0.05$). In rectal cancer patients, ultra-low anterior resections had the highest risk of AL (4.6%), and associations were found with neoadjuvant chemotherapy ($p = 0.011$), surgery in a public hospital ($p = 0.019$), and an open approach ($p = 0.035$). Anastomosis formation technique (hand-sewn vs stapled) did not impact on rate of AL.

Conclusion

Clinicians should be cognisant of the predictive factors for AL and consider early intervention for patients at risk of this.

Presenter 6 – Karishma Jassal

Title

Artificial intelligence for preoperative diagnosis of malignant thyroid nodules based on sonographic features and cytology category.

Authors' full names and qualifications

Karishma Jassal (1,2) – MBBS, FRACS

Afsanesh Koohestani (1,2) – PhD

Andrew Kiu (2) – MBBS, FRACS

April Strong (2) – BSc, MD

Nandhini Ravintharan (2) – BSc, MD

Meei Yeung (1,2) – MBBS, FRACS

Simon Grodski (1,2) – MBBS, FRACS

Jonathan W Serpell (1,2) – MBBS, MD, MEd, FACS, FRACS, FRCSEd (ad hom)

James C Lee (1,2) – MBBS, FRACS, PhD

Authors' Affiliations

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Abstract

Background

Current diagnosis and classification of thyroid nodules are susceptible to subjective factors. Despite widespread use of ultrasonography (USG) and fine needle aspiration cytology (FNAC) to assess thyroid nodules, the interpretation of results is nuanced and requires specialist endocrine surgery input. Using readily available pre-operative data, the aims of this study were to develop artificial intelligence (AI) models to classify nodules into likely benign or malignant; and to compare the diagnostic performance of the models.

Methods

Patients undergoing surgery for thyroid nodules between 2010 – 2020 were recruited from our institution's database into training and testing groups. Demographics, serum TSH level, cytology, ultrasonography features and histopathology data were extracted. The training group USG images were re-reviewed by a study radiologist experienced in thyroid USG, who reported the relevant features and supplemented with data extracted from existing reports to reduce sampling bias. Testing group USG features were extracted solely from existing reports to reflect real-life practice of a non-thyroid specialist. We developed four AI models based on classification algorithms (k-Nearest Neighbour, Support Vector Machine, Decision Tree, Naïve Bayes) and evaluated their diagnostic performance of thyroid malignancy.

Results

In the training group (n=857) 75% were female and 27% of cases were malignant. The testing group (n=198) consisted of 77% females and 17% malignant cases. Mean age was 54.7 $\pm$ 16.2 years for the training group and 50.1 $\pm$ 17.4 years for the testing group. Following validation with the testing group, Support Vector Machine classifier was found to perform best in predicting final histopathology with an accuracy of 89 %, sensitivity 89 %, specificity 83 %, F-score 94 % and AUROC 0.86.

Conclusion

We have developed a first of its kind, pilot AI model that can accurately predict malignancy in thyroid nodules using USG features, FNAC, demographics and serum TSH. There is potential for a model like this to be used as a decision support tool in under-resourced areas as well as by non-thyroid specialists.

Presenter 7 – Timea Jurth

The role of pulmonary compliance in the surgical management of chronic thromboembolic pulmonary hypertension

Dr Timea Jurth

Background and aims:

Pulmonary endarterectomy (PEA) offers a potentially curable treatment for chronic thromboembolic pulmonary hypertension (CTEPH). However, outcomes are often unpredictable, with residual high pulmonary vascular resistance (PVR) and persisting symptoms observed not infrequently despite successful resection of thromboembolic material.

The severity of CTEPH is based predominantly on the magnitude of PVR and successful treatment defined by the normalisation of PVR post PEA. Pulmonary compliance (PCa), the distensibility of the arterial wall, characteristically decreases in CTEPH, even preceding increases in PVR, however it is not routinely measured in these patients.

Methods:

This retrospective study analysed the haemodynamic (PVR and PCa) and functional outcomes (NYHA functional classification and 6-minute walk test) and the relationship between them in 100 consecutive patients following PEA for the treatment of CTEPH at the Alfred Hospital between 2014 and 2021.

Results:

A significant increase in PCa and reduction in PVR and NYHA grade was demonstrated at 6 months post-operatively. Furthermore, PEA resulted in a higher increment in PCa for any given decrease in PVR. The NYHA functional classification decreased on average by one grade, an outcome that showed a stronger association with improvement in PCa in comparison to PVR.

Conclusions:

Our findings suggest PEA may be a treatment primarily for the reversal of altered PCa rather than PVR alone. PCa is currently an underutilised parameter in the assessment of CTEPH but its inclusion could contribute to better patient selection by refining the evaluation of CTEPH severity and its treatment outcomes.

Presenter 8 – Matthew Yii

Middle ear barotrauma prevention for patients undergoing hyperbaric therapy – unconventional use of the intravenous cannula

Yii M, Rowson A, Truong M, Tan H, Kilby J, Gan C, Webb H, Hill F

Background and Aim

Middle ear barotrauma is a common complication of hyperbaric oxygen therapy. Placement of tympanostomy tubes provides barotrauma prevention by facilitating equalisation of the middle ear. We describe variations on a technique published by Mooney et al (2001) and Zhang et al (2012) of placing tympanostomy tubes via modified use of peripheral intravenous cannulae (PIVC) which can be performed at the bedside under topical anaesthetic. We aim to evaluate the safety and efficacy of this technique when performed to prevent otic barotrauma in patients undergoing hyperbaric therapy.

Methods

We performed a retrospective analysis. Data was collected from an Australian hospital with a state-wide hyperbaric service over a four-year time-period between 2018 and 2022. Patients were identified via unit audit data. Electronic medical records were reviewed to assess patient, hyperbaric therapy, tympanostomy insertion factors and complications.

Results

112 patients (220 ears) were found to have undergone modified PIVC ventilation tube insertion over a four-year period. The median age was 61.5 years. 38 patients (33.9%) were female, 74 (66.1%) were male. 34 ears (15.5%) had pre-existing barotrauma at the time of tympanostomy tube insertion. Patients underwent a mean of 11.5 dives with ventilation tubes being required for a mean of 15.0 days to complete hyperbaric therapy. 14 ventilation tubes (6.4%) developed blockage during hyperbaric therapy. 12 ventilation tubes (5.5%)

prematurely extruded. 16 ears (7.3%) required re-insertion of ventilation tubes. Only 9 ears (4.1%) suffered barotrauma despite having ventilation tubes inserted.

Conclusions

Prophylaxis against otic barotrauma is paramount in ensuring safety for patients undergoing hyperbaric oxygen therapy. We describe a safe, effective, and convenient technique for barotrauma prevention via modified use of the PIVC.

Presenter 9 – Antonia Rowson

Sensorineural hearing loss in otic capsule-sparing petrous temporal bone fractures: an under-recognised phenomenon

Background and Aims: Given the relationship of the temporal bone to many vital structures, petrous temporal bone (PTB) fractures can have significant implications. The sequelae of otic capsule-violating fractures on hearing outcomes has long been appreciated, but hearing loss in those with otic capsule-sparing fractures is less well-characterised.

Methods: We reviewed cases referred to the otolaryngology service at The Alfred from 2018 to 2022. Unilateral PTB fractures without known pre-existing hearing loss followed-up with audiometry were included. Data were obtained from medical and unit audit records. Differences in four-frequency pure tone average (PTA) (at 0.5, 1, 2, and 4 kHz) between side of PTB fracture and unaffected side were calculated.

Results: Of 122 unilateral otic-capsule sparing PTB fractures, 33 individuals had a PTA >25 dB in their PTB fracture-affected ear, as compared to 26 non-fractured ears (p=0.32). Mean PTA was 5.05 dB worse in ears with PTB fractures (95% CI 3.21-6.89, p=<0.001); notably, 20.5% of cases had a 10 dB or greater PTA deficit. Discrepancy in hearing between fracture-affected and unaffected ears increased with higher frequencies, with an average 2.62 dB difference at 0.5 kHz, 3.48 dB at 1 kHz, 5.78 dB at 2 kHz, and 8.32 dB at 4 kHz.

Conclusions: Otic capsule-sparing PTB fractures are associated with sensorineural hearing loss, particularly at high frequencies. Patients can be reassured that in many cases, this hearing loss is mild, and unlikely to be appreciably noticed. Consideration of early audiometry in the acute setting, and prescription of high-dose steroids as required, warrants further exploration as a means of ameliorating final hearing outcomes in PTB fractured ears.

Presenter 10 – Antony Takla

Is response to local anaesthetic hip injections useful in predicting postoperative outcomes following arthroscopy for Femoroacetabular Impingement Syndrome? A systematic review and meta-analysis.

Submission by: Antony Takla (primary author). Word count (excluding title): 250

Background: Femoroacetabular impingement (FAI) syndrome is a common cause of hip pain and dysfunction that is affecting an increasingly large number of young adults, especially those who engage in rigorous physical activity. One of the definitive ways of managing this disease is to arthroscopically correct the anatomical anomalies associated with FAI. It has been proposed that response to a pre-operative anaesthetic/ steroid intra-articular (IA) hip injection can help predict response to hip arthroscopy. ***Methods:*** A systematic search of Medline, SCOPUS, PubMed, CINAHL and Cochrane was conducted to identify studies examining the relationship between response to IA hip injections and arthroscopy outcomes for FAI syndrome. ***Results***: Eight studies met our inclusion criteria and were included in this review. These studies comprised of a total of 733 patients (of whom 59% were female) with a mean age of 37.7. Three of the eight studies found a statistically significant positive correlation between response to IA injections and arthroscopy outcomes. Five studies were suitable for a meta-analysis, which showed that a positive response to IA injections increased likelihood of a positive outcome post-arthroscopy by 83%, however, this was not statistically significant (odds ratio of 1.83, 95% CI of 0.83 – 4.0). ***Conclusion:*** Ultimately, this review found that although IA hip injections can be a useful prognostic tool, they are not a strongly reliable predictor of which patients will have good arthroscopic outcomes. As such, IA injections should be used in combination with other parameters like clinical history, examination, and radiological findings when deciding to operate.