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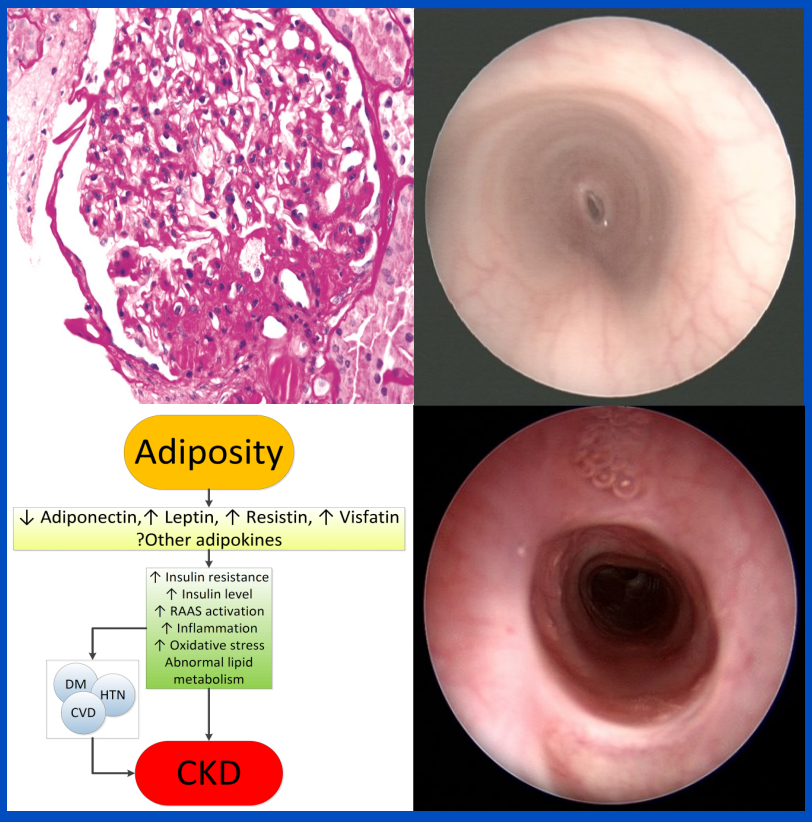

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Obesity and kidney disease: hidden consequences of the epidemic

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ABSTRACT

Obesity has become a worldwide epidemic, and its prevalence has been projected to grow by 40% in the next decade. This increasing prevalence has implications for the risk of diabetes, cardiovascular disease and also for Chronic Kidney Disease (CKD). A high body mass index is one of the strongest risk factors for new-onset CKD. In individuals affected by obesity, a compensatory hyperfiltration occurs to meet the heightened metabolic demands of the increased body weight. The increase in intraglomerular pressure can damage the kidneys and raise the risk of developing CKD in the long-term. The incidence of obesity-related glomerulopathy has increased ten-fold in recent years. Obesity has also been shown to be a risk factor for nephrolithiasis, and for a number of malignancies including kidney cancer. This year the World Kidney Day promotes education on the harmful consequences of obesity and its association with kidney disease, advocating healthy lifestyle and health policy measures that makes preventive behaviours an affordable option.

Keywords: obesity, chronic kidney disease, nephrolithiasis, kidney cancer, prevention

INTRODUCTION

In 2014, over 600 million adults worldwide, 18 years and older, were obese. Obesity is a potent risk factor for the development of kidney disease. It increases the risk of developing major risk factors for Chronic Kidney Disease (CKD), like diabetes and hypertension, and it has a direct impact on the development of CKD and end-stage renal disease (ESRD). In individuals affected by obesity, a (likely) compensatory mechanism of hyperfiltration occurs to meet the heightened metabolic demands of the increased body weight. The increase in intraglomerular pressure can damage the kidney structure and raise the risk of developing CKD in the long-term.

The good news is that obesity, as well as the related CKD, are largely preventable. Education and awareness of the risks of obesity and a healthy lifestyle, including proper nutrition and exercise, can dramatically help in preventing obesity and kidney disease. This article reviews the association of obesity with

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** refer to pg 7 for details of World Kidney Day Steering Committee*

kidney disease on the occasion of the 2017 World Kidney Day.

Epidemiology of obesity in adults and children

Over the last three decades, the prevalence of overweight and obese adults (BMI ≥25 kg/ m^2) worldwide has increased substantially. [1] In the US, the age-adjusted prevalence of obesity in 2013-2014 was 35% among men and 40.4% among women. [2] The problem of obesity also affects children. In the US in 2011-2014, the prevalence of obesity was 17% and extreme obesity 5.8% among youth 2-19 years of age. The rise in obesity prevalence is also a worldwide concern, [3, 4] as it is projected to grow by 40% across the globe in the next decade. Low- and middle-income countries are now showing evidence of transitioning from normal weight to overweight and obesity as parts of Europe and the US did decades ago. [5] This increasing prevalence of obesity has implications for cardiovascular disease (CVD) and also for CKD. A high body mass index (BMI) is one of the strongest risk factors for new-onset CKD. [6, 7]

Definitions of obesity are most often based on BMI (i.e. weight [kilograms] divided by the square of his or her height [meters]). A BMI between 18.5 and 25 kg/m^2 is considered by the World Health Organisation (WHO) to be normal weight, a BMI between 25 and 30 kg/m^2 as overweight, and a BMI of >30 kg/m^2 as obese. Although BMI is easy to calculate, it is a poor estimate of fat mass distribution, as muscular individuals or those with more subcutaneous fat may have a BMI as high as individuals with larger intraabdominal (visceral) fat. The latter type of high BMI is associated with substantially higher risk of metabolic and cardiovascular disease. Alternative parameters to more accurately capture visceral fat include waist circumference (WC) and a waist hip ratio (WHR) of >102 cm and 0.9, respectively, for men and >88 cm and >0.8, respectively, for women. WHR has been shown to be superior to BMI for the correct classification of obesity in CKD.

Association of obesity with CKD and other renal complications

Numerous population based studies have shown an association between measures of obesity and both the development and the progression of CKD (Table 1). Higher BMI is associated with the presence [8] and development [9-11] of proteinuria in individuals without kidney disease. Furthermore, in numerous large population-based studies, higher BMI appears associated with the presence [8, 12] and development of low estimated GFR, [9, 10, 13] with more rapid loss of estimated GFR over time, [14] and with the incidence of ESRD. [15-18] Elevated BMI levels, class II obesity and above, have been associated with more rapid progression of CKD in patients with pre-existing CKD. [19] A few studies examining the association of abdominal obesity using WHR or WC with CKD, describe an association between higher girth and albuminuria, [20] decreased GFR [8] or incident ESRD [21] independent of BMI level.

Higher visceral adipose tissue measured by computed tomography has been associated with a higher prevalence of albuminuria in men. [22] The observation of a BMI-independent association between abdominal obesity and poorer renal outcomes is also described in relationship with mortality in patients with ESRD [23] and kidney transplant, [24] and suggests a direct role of visceral adiposity. In general, the associations between obesity and poorer renal outcomes persist even after adjustments for possible mediators of obesity's cardiovascular and metabolic effects, such as high blood pressure and diabetes mellitus, suggesting that obesity may affect kidney function through mechanisms in part unrelated to these complications (vide infra).

The deleterious effect of obesity on the kidneys extends to other complications

Table 1: Studies examining the association of obesity with various measures of CKD.

Study	Patients	Exposure	Outcomes	Results	Comments
Prevention of Renal and Vascular End-Stage Disease (PREVEND) Study [8]	7,676 Dutch individuals without diabetes	Elevated BMI (overweight and obese*), and central fat distribution (waist-hip ratio)	-Presence of urine albumin 30-300 mg/24h -Elevated and diminished GFR	-Obese + central fat: higher risk of albuminuria -Obese +/- central fat: higher risk of elevated GFR -Central fat +/- obesity associated with diminished filtration	Cross sectional analysis
Multinational study of hypertensive outpatients[20]	20,828 patients from 26 countries	BMI and waist circumference	Prevalence of albuminuria by dip stick	Higher waist circumference associated with albuminuria independent of BMI	Cross sectional analysis
Framingham Multi-Detector Computed Tomography (MDCT) cohort[22]	3,099 individuals	Visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT)	Prevalence of UACR >25 mg/g in women and >17 mg/g in men	VAT associated with albuminuria in men, but not in women	Cross sectional analysis
CARDIA (Coronary Artery Risk Development in Young Adults) study[11]	2,354 community-dwelling individuals with normal kidney function aged 28-40 years	-Obesity (BMI >30 kg/m^2) -Diet and lifestyle-related factors	Incident microalbuminuria	Obesity (OR 1.9) and unhealthy diet (OR 2.0) associated with incident albuminuria	Low number of events
Hypertension Detection and Follow-Up Program[10]	5,897 hypertensive adults	Overweight and obese BMI* vs. normal BMI	Incident CKD (1+ or greater proteinuria on urinalysis and/or an eGFR <60 mL/min/1.73 m^2)	Both overweight (OR 1.21) and obesity (OR 1.40) associated with incident CKD	Results unchanged after excluding diabetics
Framingham Offspring Study[9]	2,676 individuals free of CKD stage 3	High vs. normal BMI*	-Incident CKD stage 3 -Incident proteinuria	-Higher BMI not associated with CKD3 after adjustments -Higher BMI associated with increased odds of incident proteinuria	Predominantly white, limited geography
Physicians' Health Study[13]	11,104 initially healthy men in US	-BMI quintiles -Increase in BMI over time (vs. stable BMI)	Incident eGFR <60 mL/min/1.73 m^2	-Higher baseline BMI and increase in BMI over time both associated with higher risk of incident CKD	Exclusively men
Nation-wide US Veterans Administration cohort[14]	3,376,187 US veterans with baseline eGFR ≥60 mL/min/1.73 m^2	BMI categories from <20 to >50 kg/m^2	Rapid decline in kidney function (negative eGFR slope of >5 mL/min/1.73 m^2)	BMI >30 kg/m^2 associated with rapid loss of kidney function	Associations more accentuated in older individuals
Nation-wide population-based study from Sweden[12]	926 Swedes with moderate/advanced CKD compared to 998 controls	BMI ≥25 vs. <25 kg/m^2	CKD vs. no CKD	Higher BMI associated with 3x higher risk of CKD	-Risk strongest in diabetics, but also significantly higher in non-diabetics -Cross sectional analysis
Nation-wide population based study in Israel[17]	1,194,704 adolescent males and females examined for military service	Elevated BMI (overweight and obesity) vs. normal BMI*	Incident ESRD	Overweight (HR 3.0) and obesity (HR 6.89) associated with higher risk of ESRD	Associations strongest for diabetic ESRD, but also significantly higher for non-diabetic ESRD
The Nord-Trøndelag Health Study (HUNT-1)[15]	74,986 Norwegian adults	BMI categories*	Incidence of ESRD or renal death	BMI >30 kg/m^2 associated with worse outcomes	Associations not present in individuals with BL <120/80 mmHg
Community-based screening in Okinawa, Japan[16]	100,753 individuals >20 years old	BMI quartiles	Incidence of ESRD	Higher BMI associated with increased risk of ESRD in men, but not in women	Average BMI lower in Japan compared to Western countries
Nation-wide US Veterans Administration cohort[19]	453,946 US veterans with baseline eGFR<60 ml/min per 1.73 m^2	BMI categories from <20 to >50 kg/m^2	-Incidence of ESRD -Doubling of serum creatinine -Slopes of eGFR	Moderate and severe obesity associated with worse renal outcomes	Associations present but weaker in patients with more advanced CKD
Kaiser Permanente Northern California[18]	320,252 adults with and without baseline CKD	Overweight, class I, II and extreme obesity; vs. normal BMI*	Incidence of ESRD	Linearly higher risk of ESRD with higher BMI categories	Associations remained present after adjustment for DM, hypertension and baseline CKD
REGARDS (Reasons for Geographic and Racial Differences in Stroke) Study[21]	30,239 individuals	Elevated waist circumference or BMI	Incidence of ESRD	BMI above normal not associated with ESRD after adjustment for waist circumference -Higher waist circumference associated with ESRD	Association of waist circumference with ESRD became on-significant after adjustment for comorbidities and baseline eGFR and proteinuria

such as nephrolithiasis and kidney malignancies. Higher BMI is associated with an increased prevalence [25] and incidence [26, 27] of nephrolithiasis. Furthermore, weight gain over time, and higher baseline WC were also associated with higher incidence of nephrolithiasis. [27] Obesity is associated with various types of malignancies, particularly cancers of the kidneys. In a population-based study of 5.24 million individuals from the UK, a 5 kg/m^2 higher BMI was associated with a 25% higher risk of kidney cancers, with 10% of all kidney cancers attributable to excess weight. [28] Another large analysis examining the global burden of obesity on malignancies estimated that 17% and 26% of all kidney cancers in men and women, respectively, were attributable to excess weight. [29] The association between obesity and kidney cancers was consistent in both men and women, and across populations from different parts of the world in a meta-analysis that included data from 221 studies (of which 17 examined kidney cancers). [30] Among the cancers examined in this meta-analysis, kidney cancers had the third highest risk associated with obesity (relative risk per 5 kg/m^2 higher BMI: 1.24, 95% CI 1.20-1.28, p<0.0001). [30]

Mechanisms of action underlying the renal effects of obesity

Obesity results in complex metabolic abnormalities which have wide-ranging effects on diseases affecting the kidneys. The exact mechanisms whereby obesity may worsen or cause CKD remain unclear. The fact that most obese individuals never develop CKD, and the distinction of up to as many as 25% of obese individuals as "metabolically healthy" suggests that increased weight alone is not sufficient to induce kidney damage. [31] Some of the deleterious renal consequences of obesity may be mediated by downstream comorbid conditions such as diabetes mellitus or hypertension, but there are also effects of adiposity which could impact the kidneys directly, induced by the endocrine activity of the adipose

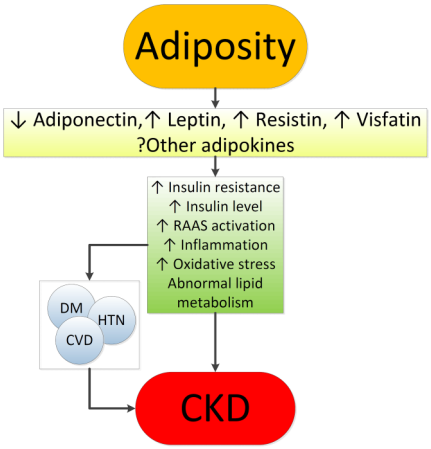

Fig. 1: Putative mechanisms of action whereby obesity causes chronic kidney disease.

tissue via production of (among others) adiponectin, [32] leptin [33] and resistin [34] (Figure 1). These include the development of inflammation, [35] oxidative stress, [36] abnormal lipid metabolism, [37] activation of the renin-angiotensin-aldosterone system,[38] and increased production of insulin and insulin resistance. [39, 40]

These various effects result in specific pathologic changes in the kidneys [41] which could underlie the higher risk of CKD seen in observational studies. These include ectopic lipid accumulation [42] and increased deposition of renal sinus fat, [43, 44] the development of glomerular hypertension and increased glomerular permeability caused by hyperfiltration-related glomerular filtration barrier injury, [45] and ultimately the development of glomerulomegaly, [46] and focal or segmental glomerulosclerosis [41] (Figure 2). The incidence of the so-called obesity-related glomerulopathy (ORG) has increased ten-fold between 1986 and 2000. [41] Importantly, ORG often presents along with pathophysiologic processes related to other conditions or advanced age, conspiring to result in more accentuated kidney damage in patients with high blood pressure[47] or in the elderly. [14, 39]

Obesity is associated with a number of

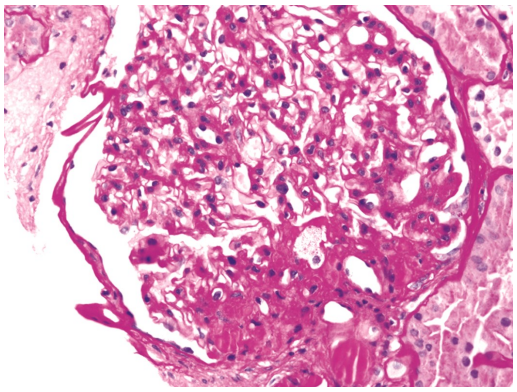

Fig. 2: Obesity-related perihilar focal segmental glomerulosclerosis on a background of glomerulomegaly. Periodic Acid-Schiff stain, original magnification 400x.
Courtesy of Dr. Patrick D. Walker, MD; Arkana Laboratories, Little Rock, AR.

risk factors contributing to the higher incidence and prevalence of nephrolithiasis. Higher body weight is associated with lower urine pH [48] and increased urinary oxalate, [49] uric acid, sodium and phosphate excretion [50] Diets richer in protein and sodium may lead to a more acidic urine and decrease in urinary citrate, also contributing to kidney stone risk. The insulin resistance characteristic of obesity may also predispose to nephrolithiasis [51] through its impact on tubular Na-H exchanger [52] and ammoniagenesis, [53] and the promotion of an acidic milieu. [54] Complicating the picture is the fact that some weight loss therapies result in a worsening, rather than an improvement in the risk for kidney stone formation; increase in enteral oxalate absorption and enhanced risk of nephrolithiasis. [55]

The mechanisms behind the increased risk of kidney cancers observed in obese individuals are less well characterised. Insulin resistance, and the consequent chronic hyperinsulinemia and increased production of insulin-like growth factor 1 and numerous complex secondary humoral effects may exert stimulating effects on the growth of various types of tumor cells. [56] More recently, the endocrine functions of adipose tissue, [57] its effects on immunity, [58] and the generation of an inflammatory milieu with complex effects on cancers [59, 60] have emerged as additional explanations.

Obesity in patients with advanced kidney disease: The need for a nuanced approach

Considering the above evidence about the overwhelmingly deleterious effects of obesity on various disease processes, it is seemingly counterintuitive that obesity has been consistently associated with lower mortality rates in patients with advanced CKD [19, 61] and ESRD. [62, 63] Similar "paradoxical" associations have also been described in other populations, such as in patients with congestive heart failure [64], chronic obstructive pulmonary disease [65], rheumatoid arthritis, [66] and even in old individuals. [67] It is possible that the seemingly protective effect of a high BMI is the result of the imperfection of BMI as a measure of obesity, as it does not differentiate the effects of adiposity from those of higher non-adipose tissue. Indeed, studies that separated the effects of a higher waist circumference from those of higher BMI showed a reversal of the inverse association with mortality. [23, 24] Higher muscle mass has also been shown to explain at least some of the positive effects attributed to elevated BMI. [63, 68] However, there is also evidence to suggest that higher adiposity, especially subcutaneous (non-visceral) fat, may also be associated with better outcomes in ESRD patients. [62] Such benefits may indeed be present in patients who have very low short term life expectancy, such as most ESRD patients. [69] Indeed, some studies that examined the association of BMI with time-dependent survival in ESRD have shown a marked contrast between protective short term effects vs. deleterious longer term effects of higher BMI. [70] There are several putative short term benefits that higher body mass could portend, especially to sicker individuals. These include a benefit from the better nutritional status typically seen in obese individuals, and which provides better protein and

energy reserves in the face of acute illness, and a higher muscle mass with enhanced antioxidant capacity [63] and lower circulating actin and higher plasma gelsolin levels, [71] which are associated with better outcomes. Other hypothetically beneficial characteristics of obesity include a more stable haemodynamic status with mitigation of stress responses and heightened sympathetic and renin-angiotensin activity; [72] increased production of adiponectines [73] and soluble tumour necrosis factor alfa receptors [74] by adipose tissue neutralising the adverse effects of tumor necrosis factor alfa; enhanced binding of circulating endotoxins [75] by the characteristically higher cholesterol levels seen in obesity; and sequestration of uraemic toxins by adipose tissue. [76]

Potential interventions for management of obesity

Obesity engenders kidney injury via direct mechanisms through deranged synthesis of various adipose tissue cytokines with nephrotoxic potential, as well as indirectly by triggering diabetes and hypertension, i.e. two conditions that rank among the strongest risk factors for CKD. Perhaps due to the survival advantage of obesity in CKD, the prevalence of end stage kidney disease is on the rise both in the US [77] and in Europe. [78] Strategies for controlling the obesity related CKD epidemic at population level and for countering the evolution of CKD toward kidney failure in obese patients represent the most tantalising task that today's health planners, health managers and nephrologists face.

Countering CKD at population level

Calls for public health interventions in the community to prevent and treat CKD at an early stage have been made by major renal associations, including the International Society of Nephrology (ISN), International Federation of the Kidney Foundation (IFKF), the European renal association (ERA-EDTA) and various national societies. In the USA, Healthy People 2020, a programme that sets 10-year health targets for health promotion and prevention goals, focuses both on CKD and obesity. Surveys to detect obese patients, particularly those with a high risk of CKD (e.g. hypertensive and/or diabetic obese people) and those receiving suboptimal care to inform these patients of the potential risk for CKD they are exposed to, is the first step towards developing public health interventions. Acquiring evidence that current interventions to reduce CKD risk in the obese are efficacious and deployable, is an urgent priority to set goals and means for risk modification. Appropriate documentation of existing knowledge distilling the risk and the benefits of primary and secondary prevention interventions in obese people, and new trials in this population to fill knowledge gaps (see below) are needed. Finally, surveillance programmes that monitor progress on the detection of at-risk individuals and the effectiveness of prevention programmes being deployed [79] constitute the third, fundamental element for establishing efficacious CKD prevention plans at population level.

A successful surveillance system for CKD has already been implemented in some places such as the United Kingdom (UK). [80] A campaign to disseminate and apply K-DOQI CKD guidelines in primary care within the UK National Health Service was launched. This progressively increased the adoption of K-DOQI guidelines and, also thanks to specific incentives for UK general physicians to detect CKD, led to an impressive improvement in the detection and care of CKD, i.e. better control of hypertension and increased use of angiotensin-converting enzyme and angiotensin receptor blockers. [80] This system may serve as a platform to improve the prevention of obesity-related CKD. Campaigns aiming at reducing the obesity burden are now at center stage worldwide and are strongly recommended by the WHO and it is expected that these campaigns will reduce the incidence of obesity -related complications, including CKD. Howev-

er obesity-related goals in obese CKD patients remain vaguely formulated, largely because of the paucity of high-level evidence intervention studies to modify obesity in CKD patients. [81]

Prevention of CKD progression in obese people with CKD

Observational studies in metabolically healthy obese subjects show that the obese phenotype unassociated with metabolic abnormalities per se predicts a higher risk for incident CKD [82] suggesting that obesity per se may engender renal dysfunction and kidney damage even without diabetes or hypertension (vide supra). In overweight or obese diabetic patients, a lifestyle intervention including caloric restriction and increased physical activity compared with a standard follow up based on education and support to sustain diabetes treatment reduced the risk for incident CKD by 30%, although it did not affect the incidence of cardiovascular events. [83] Such a protective effect was partly due to reductions in body weight, HbA1c, and systolic BP. No safety concerns regarding kidney-related adverse events were seen. [83] In a recent meta-analysis collating experimental studies in obese CKD patients, interventions aimed at reducing body weight showed coherent reductions in blood pressure, glomerular hyper-filtration and proteinuria. [81] A thorough post-hoc analysis of the REIN study showed that the nephron-protective effect of ACE inhibition in proteinuric CKD patients was maximal in obese CKD patients, but minimal in CKD patients with normal or low BMI. [84] Of note, bariatric surgical intervention have been suggested for selected CKD and ESRD patients including dialysis patients who are wait-listed for kidney transplantation. [85-87]

Globally, these experimental findings provide a proof of concept for the usefulness of weight reduction and ACE inhibition interventions in the treatment of CKD in the obese. Studies showing a survival benefit of increased BMI in CKD patients, however, remain to be explained. [88] These findings limit our ability to make strong recommendations about the usefulness and the safety of weight reduction to reduce body weight in obese people at risk for CKD and in those with early CKD appear justified, particularly recommendations for the control of diabetes and hypertension. As the independent effect of obesity control on the incidence and progression of CKD is difficult to disentangle from the effects of hypertension and type 2 diabetes, recommendation of weight loss in the minority of metabolically healthy, non-hypertensive obese patients remains unwarranted. These considerations suggest that a therapeutic approach to overweight and obesity in patients with advanced CKD or other significant comorbid conditions has to be pursued carefully, with proper considerations of the expected benefits and potential complications of weight loss over the life span of the individual patient.

CONCLUSIONS

The worldwide epidemic of obesity affects the Earth's population in many ways. Diseases of the kidneys, including CKD, nephrolithiasis and kidney cancers are among the more insidious effects of obesity, but which nonetheless have wide ranging deleterious consequences, ultimately leading to significant excess morbidity and mortality and excess costs to individuals and the entire society. Population-wide interventions to control obesity could have beneficial effects in preventing the development, or delaying the progression of CKD. It is incumbent upon the entire healthcare community to devise long-ranging strategies towards improving the understanding of the links between obesity and kidney diseases, and to determine optimal strategies to stem the tide. The 2017 World Kidney Day is an important opportunity to increase education and awareness to that end.

* Members of the World Kidney Day Steering Committee are: Philip Kam Tao Li, Guillermo Garcia-Garcia, Mohammed Benghanem-Gharbi, Rik Bollaert, Sophie Dupuis, Timur Erk, Kamyar Kalantar-Zadeh, Csaba Kovesdy, Charlotte Osafo, Miguel C. Riella, Elena Zakharova.

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Sociodemographic factors associated with uptake of exclusive breastfeeding practice in Brunei Darussalam.

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ABSTRACT

Introduction: Exclusive breastfeeding is the practice of exclusively breastfeeding the newborn from the early hours of life to six months. This practice is encouraged to improve health of baby and also bonding. However, how widely practiced is exclusive breastfeeding in our local setting is unknown. This study aimed to establish the prevalence and socio-demographic factors affecting the uptake of exclusive breastfeeding practice among working and non-working (full-time housewives) mothers in Brunei Darussalam. **Materials and Methods**: This is a retrospective review of secondary longitudinal data from 5,484 child health records, aged from one to six months, obtained from 22 Maternal and Child Health clinics in Brunei Darussalam in 2010. The study population represents 85.5% of the total live births in Brunei Darussalam for the year 2010. **Results**: Exclusive breastfeeding steadily declined from 71% at the first month after birth to 29% by six months. Exclusive breastfeeding practice at six months was higher in non-working mothers (36.7%) compared to working mothers (17.9% private, and 24.9% government workers) (p<0.001). Parity, maternal race, and maternal employment status were significantly associated with exclusive breastfeeding practice; but no relationship was found between exclusive breastfeeding practice and geographical area of residence of the mother, or sex of the child. Multivariate analyses showed working mothers (private sector, adjusted Odds Ratio, AOR=0.40, p<0.001; and government sector, AOR=0.55, p<0.001) were less likely to practice exclusive breastfeeding for six months than non-working mothers. Primiparous mothers were also less likely to practice exclusive breastfeeding for six months (AOR=0.74, p<0.001) compared to multiparous mothers. **Conclusion**: The prevalence of exclusive breastfeeding progressively declines from first month to only 29% at six months in Brunei Darussalam in 2010. Non-working mothers were more likely to continue exclusive breastfeeding at six months. These findings have important implications for future studies, policies and programmes on maternal and child health in the country.

Keywords: Breastfeeding, Maternal, Child Health and Nutrition, Early Life

INTRODUCTION

Exclusive breastfeeding (EBF) is the practice of exclusively breastfeeding the newborn from the early hours of life to six months, with the exception of prescribed medication such as vitamins, rehydration therapy and other medicines. [1] EBF had been found to be of immense benefit (short and long term) to both mother and child. For mothers, it has been associated with rapid weight loss after birth and delayed ovulation, postpartum; while in infants, it has been shown to reduce

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with the exception of prescribed medication such as vitamins, rehydration therapy and other medicines. [1] EBF had been found to be of immense benefit (short and long term) to both mother and child. For mothers, it has been associated with rapid weight loss after birth and delayed ovulation, postpartum; while in infants, it has been shown to reduce risk of childhood-related morbidity and mortality especially from gastrointestinal diseases. [2] A review of existing literatures also suggested that breastfeeding practices possibly could possibly reduce the risk of breast cancer in mothers. [3]

Studies have confirmed the association of continued EBF at six months with decreased risks of several childhood related diseases and illnesses such as asthma, obesity, and early years of hospitalisation due to respiratory tract infections, and with improved cognitive function and health in general. [4–6] EBF also makes economic sense; a recent pediatric cost-analysis report in United States of America calculated a possible cost saving annually of up to US$13 billion spent on childhood illnesses and formula feeding—and prevent nearly 1,000 infant deaths— if 90% US mothers could practice EBF as recommended by the World Health Organisation. [7]

In Brunei Darussalam, the prevalence of EBF at six months was reported to be 26.7% in 2009 according to the 2nd national health and nutritional status survey, NHANSS. [8] While the prevalence of EBF was low, the top three reasons why mothers gave up practicing EBF were stress, (perceived) insufficient breast-milk, and need to resume working for employed mothers. [8] Maternal employment has been previously reported as a significant negative factor for the uptake of EBF. [9, 10] It was for this reason that the International Labor Organisation (ILO) advocated for a minimum of 14 weeks paid and protected maternity leave for employed new mothers. However, in its recent statistics on 185 countries, only 98 countries had adhered to its recommendations. [11] Other barriers apart from maternal employment hindering the practice of EBF by mothers include short periods between pregnancies, [12] maternal residence location,[13] higher maternal socioeconomic status and education. [14]

This study provides a national prevalence of EBF as well as determinants for EBF among new mothers in Brunei in 2010. Considering that the duration of maternity leave in Brunei Darussalam was increased from eight weeks to 15 weeks in the following year, 2011, [15] the results reported in this study would serve as a yardstick upon which future EBF practice (post-maternity leave extension) and studies on EBF could use to measure change in pattern or practice of breastfeeding in Brunei Darussalam. Therefore, this study has important implication for post-policy evaluation with regards to EBF practices and maternal and child health related legislations.

MATERIALS AND METHODS

This retrospective study was conducted using secondary longitudinal health (breastfeeding) records obtained from all the 22 government MCH Clinics in Brunei Darussalam to determine the cross-sectional distribution of EBF in the country for the year 2010. The study protocol was approved by the Medical and Health Research Ethics Committee (MHREC), Ministry of Health, Brunei Darussalam.

The eligible criteria for inclusion in this study was availability of complete EBF status record for 1-6 months and child age. Records for adopted children and incomplete records were excluded. Mothers were asked their exclusive breastfeeding status monthly (1-6 months) at the MCH clinics as part of the mandatory child developmental check-up. Maternal reasons for giving up EBF were also recorded. 5,484 records (representing 85.5% of total live birth [6,412] were retrieved from

the Birth and Registrations section, Immigration Department for the year 2010, which forms the dataset for analysis in this study.

The Statistical Package for the Social Sciences (SPSS) version 15.0 was used to analyze the data. The frequency distribution of EBF was determined using descriptive statistics. Chi-square test was used to assess the level of statistical difference between comparable groups, and multivariate analysis was done on variables that showed statistical significance at univariate analyses to determine adjusted odds of covariates for the likelihood of practicing EBF at six months. All difference at $p<0.05$ were considered statistical significant.

RESULTS

Overall, 89.3% of the study participants were Bruneians; 70.1% were multiparous mother; and 85.9% were Malay. The full demographic profile of the study population is shown in Table 1.

Table 1: Demographic profile of the study participants (N=5,484).

Variable		n (%)
Mother's citizenship		
	Bruneian	4,899 (89.3)
	non-Bruneian	585 (10.7)
Parity		
	Primiparous	1,641 (29.9)
	Multiparous	3,843 (70.1)
Infant Sex		
	Male	2,804 (51.1)
	Female	2,680 (48.9)
Maternal Employment sector		
	Government	2,066 (37.7)
	Private	1,056 (19.3)
	Non-working	2,362 (43.0)
Mother's race/ethnicity		
	Malay	4,710 (85.9)
	Chinese	337 (6.1)
	*Others	437 (8.0)
District of residence		
	Brunei-Muara	3,947 (72.0)
	Tutong	648 (11.8)
	Kuala Belait	749 (13.7)
	Temburong	140 (2.6)

*all other race/ethnicity apart from the other two listed

The prevalence of EBF practice in the study population was highest during the period from birth to one month at 71%. This steadily decline with each passing month and dropped to as low as 29% at 6th months (Table 2).

In comparing the prevalence of EBF among working mothers (in government and and private sectors) and non-working mothers, EBF practice was consistently higher from one to six months of infant age among non-working mothers than in the working mothers, which was statistically significant between the three groups at each month (Table 2: $p=0.003$ at first month; $p<0.001$ at every other months). The prevalence of successful EBF practice at six months among private, government workers, and non-working mothers was 17.9%, 24.9% and 36.7% respectively. Non-working mothers also had the highest prevalence followed by mothers in the govern-

Table 2: EBF Practice among from 1–6 months infant age in 2010 (N=5,484).

	Maternal Employment Status, *n (%)*			
Infant age (in months)	**Government (n=2,066)**	**Private (n=1,056)**	**Non-working**	***p* value[a]**
1	1,488 (72.0)	708 (67.0)	1,713 (72.5)	0.003
2	1,060 (51.3)	443 (42.0)	1,308 (55.4)	<0.001
3	811 (39.3)	318 (30.1)	1,116 (47.2)	<0.001
4	644 (31.2)	253 (24.0)	980 (41.5)	<0.001
5	543 (24.9)	216 (20.5)	905 (38.3)	<0.001
6	514 (24.9)	189 (17.9)	868 (36.7)	<0.001

ment sector compared to those in the private sectors (Table 2).

There was no significant association between the mother's district of residence (*P*=0.063), gender of the infant with EBF practice at six months, even though more female infants were breastfed slightly more than their male counterparts (Table 3: 29.2% vs. 28.1%; *p*=0.394). More multiparous mothers exclusively breastfed their infants (at six months) than primiparous mothers (Table 3: 30.7% vs. 23.9%; *p*<0.001). Malay Mothers (29.5%) practiced EBF at 6 months more than Chinese mothers (19.0%) and mothers of combined other ethnic groups (27.2%), and the difference was significantly different (Table 3: *p*<0.001).

Table 3: EBF at 6 months according to demographic variables.

Variable		N	n (%)	*p* value[a]
Parity				
	Primiparous	1,641	393 (23.9)	<0.001
	Multiparous	3,843	1,178 (30.7)	
Infant's gender				
	Male	2,804	789 (28.1)	0.394
	Female	2,680	782 (29.2)	
Mother's ethnicity				
	Malay	4,710	1,388 (29.5)	
	Chinese	337	64 (19.0)	<0.001
	Others	437	119 (27.2)	
District of residence				
	Brunei Muara	3,947	1,093 (27.7)	
	Tutong	648	210 (32.4)	
	Kuala Belait	749	227 (30.4)	0.063
	Temburong	140	41 (29.3)	

[a]Chi square test of independence

The results from multivariate analyses in predicting the likelihood of EBF at 6 months are also shown in Table 4. Both maternal parity and maternal employment status were significant independent predictors for EBF at 6 months. Primiparous mothers (Table 4: AOR 0.74, 95% CI: 0.64, 0.84) were 26% less likely practicing EBF than multiparous mothers (*p*<0.001). The practice of EBF at 6 months was also less likely among working mothers (Table 4: private sector: AOR 0.40, 95% CI: 0.33, 0.47; Government sector: AOR 0.56, 95% CI: 0.49, 0.64) than non-working mothers (*p*<0.001). Meanwhile, although mother's race played a role in the multiple logistic regression model (*p*=0.003), the odds of Malay mothers (Table 4: AOR 1.17, 95% CI: 0.94, 1.47) practicing EBF at 6 months was not statistically significant from mothers of 'other' ethnic group (Table 4: *p*=0.167), just as the difference in odds between Chinese mothers and mothers of other ethnic group was also not significantly differ-

Table 4: Multiple Logistic Regression of factors associated with EBF practice at six months (N=5,484).

Variable		N	Adjusted Odd Ratio (AOR)	(95% Confidence Interval; CI)	*p* value[b]
Parity					
	Primiparous	1641	0.74	(0.64, 0.84)	<0.001
	Multiparous	3843	1.00	-	-
Mother's ethnicity					0.003
	Malay	4710	1.17	(0.94, 1.47)	0.167[c]
	Chinese	337	0.73	(0.33, 0.47)	0.082[c]
	Others	437	1.00	-	-
Maternal Employment Sector					<0.001
	Government	2066	0.55	(0.48, 0.63)	<0.001[c]
	Private	1056	0.40	(0.33, 0.47)	<0.001[c]
	Non-working	2362	1.00	-	-

[b] Likelihood ratio test [c] Wald test Nagelkarke R^2=0.048

ent (Table 4: p=0.082). The three variables—parity, employment sector and mother's race/ethnicity—only explained for about 5% factors associated with EBF in multiple logistic model (Table 4).

DISCUSSION

This study showed a decline in EBF practice among mothers as infant aged; from 71% EBF at one month to 29% at six months infant age. The prevalence of EBF at six months in Brunei is less than the reported global average (39%) for the year 2010. [16] However, similar trends of decline in EBF practice as infant age were reported in previous studies conducted in different countries such as Bangladesh, Timor Leste, the United States, and others like Ethiopia. [9, 13, 14, 17, 18] For example, in Timor Leste, EBF practice decline from 68% at infant aged less than one month to 24.9% at infant aged five months in a longitudinal study on 975 infants. [13]

A systematic review of clinical trials and observational studies comparing child/maternal health outcomes with EBF for 6 months versus EBF for 3-4 months concluded that children exclusively breastfed in their first 6 months of life were less likely to experience infection-related morbidity compared to those who were partially- and mix-fed for 3-4 months. [2] The United Nations Children's Fund (UNICEF) highlighted that despite the many benefits associated with EBF practice, only about 40% of infants were being exclusively breastfed in their first six months of life. [19]

Studies have identified numerous barriers hindering the uptake of EBF by mothers such as perceived-insufficient breast milk; maternal employment and short maternity leave; short period between pregnancies; lack of antenatal counseling; higher maternal socioeconomic status and education; mode of delivery, caesarean delivery affects EBF practice; tiredness and fatigue; and many others. [8-10, 12-14, 20-22]

The 29% EBF practice at 6 months in 2010 in Brunei Darussalam (as reported in this study) although considered suboptimal by WHO standards was slightly higher than that reported in 2009 by the NHANSS study and also more than what was reported in several other countries. [7, 8] In Australia, a cohort study on 991 mother-infant pair from 5 different health clinics in three South East Queensland health service districts reported 9.5% EBF at five months. [23]

A cross-sectional study on a convenient sample of 593 Emirati mothers in the United Arab Emirate reported a suboptimal feeding of 25% EBF at six months. [24] A demographic health survey (DHS) conducted on 975 mothers in Timor-Leste reported that only 24.9% were still exclusively breastfeeding at five months. [13] Another study found a 16.8% EBF practice at six months in the United States from their cross-sectional survey on secondary data of nationally representative sample of 19,012 mothers recruited from the 2007 National Survey of Children's Health. [25] A study on a convenient-sampled 572 pairs of postpartum mother-infant from three government hospitals and three private hospitals in Jordan reported an even lower rate of EBF practice at six months of only 1%. [12]

Nevertheless, our finding was lower than the EBF (at six months) reported in some studies conducted in Bangladesh (42.5%); Ethiopia (up to 70%-age appropriate EBF); Kenya (50.3%); and Tanzania (41-58%), although another study in Tanzania reported 24.1% EBF at six months. [14, 18, 26-28] Indeed, as reported in a review, that although the prevalence of EBF practice remained low across the globe, the highest rates of EBF practice and improvements were in developing countries. [16] The global average increased from 33% in 1995 to 39% in 2010. [16]

Our findings are also in consonance with other studies that found non-working mothers to practice EBF more than the working mothers. More non-working mothers (36.7%) in our study exclusively breastfed their infants at six months than either government-employed (24.9%) or private-employed mothers (17.9%). This is similar to an analysis of secondary data (on 3,697 infants) from the Longitudinal Study of the Australian Children (LSAC) in 2004 which reported that more non-employed mothers (56%) were still breastfeeding their infants than employed (full-time) mothers (39%) at 6 months. [10] Another study carried out among 1000 professional working mothers in Ghana reported that 520 (52%) could not practice EBF; and 91% (473 of the 520) attributed their failure to practice EBF to resumption to work. [29] Similarly, a population-based study on 2098 mothers conducted in Hong Kong reported that 29.6% working mothers also attributed their failure to practice EBF to resumption to work. [22] Indeed, maternal employment, among other factors such as breast problems, tiredness, stress, area of residence, family income, race, marital status, baby refusal, mother's perception, have been shown to impede breastfeeding. [30]

This study also found a preponderance among multiparous mothers to have a higher uptake of EBF at six months compared to primiparous mothers, similar to what other studies have reported. [6, 24] In this study, the prevalence of EBF at six months was the highest among Malay mothers, and Chinese mothers had the lowest EBF practice. However, a study conducted on 2,098 mothers in Singapore reported that Chinese mothers (odds ratio, OR: 1.00) practiced EBF more than Malay mothers (OR: 0.56) but less than Indian mothers (OR: 1.33). [31] This confirms the influence of race, culture and ethnicity and environment on the practice of EBF. [14, 32]

Unlike the findings of a study carried in India which reported that girls were breastfed for a shorter duration compared to their male counterparts, our study found otherwise, although the difference was not statistically significant. [32] The authors hypothesized several possible reasons among which the need for male child due to cultural pressure is likely the reason for shorter breastfeeding span of breastfeeding for girls in India, in a bid to conceive again. [32]

Finally, the difference in EBF practice between the four districts were not statistically significant, but mothers residing in Brunei-Muara and Kuala Belait had the two lowest EBF prevalence. Both these districts are highly urbanized. In comparison, mothers in the rural districts of Tutong and Temburong had the two highest EBF prevalence. The findings of higher prevalence of EBF in rural areas as compared with urban areas are also reflected in other studies, where rural mothers tended to practice EBF more than urban mothers.[14,33]

The strength of this study lies in its national representable sample (85.5% of total live births in 2010). It gives a true reflection of EBF practice in Brunei Darussalam for the year 2010. Also the monthly recollection by the breastfeeding mothers from 1-6 months infant age makes this finding robust.

It is however important to note that some studies cited in this sections assessed the practice of EBF differently which may have influence on the direct comparison we highlighted. Some studies used the 'WHO 24-hour maternal recall' of EBF for infant aged between one and six months, which has been criticized for its tendency to overestimate EBF practice. [34, 35] Many other studies reviewed secondary data, just like this study. However, a review of 11 studies conducted between 1966 to 2003 noted that maternal recall of breastfeeding practices are valid and reliable after a period of not more than three years. [36]

In conclusion, the prevalence of EBF in Brunei for the year 2010 was lower than the global average but comparable—even better than—prevalence of EBF reported in some countries. Our study found that maternal employment has a significant negative impact on uptake of EBF, with non-working mothers more likely to practice EBF than working mothers. There is need for global advocacy and actions toward encouraging the EBF practice particularly among working mothers and also the need for improved maternity and child health coverage. For practice, health care professionals may be able to offer effective health education on breastfeeding to targeted groups such as first time mothers and working mothers who were less likely to practice EBF. In 2011, the duration of maternity leave in Brunei Darussalam was increased from 8 weeks to the recommended 15 weeks paid leave, which may have a major impact on the prevalence of EBF among working mothers. Future researches on EBF practice may seek to evaluate the impact of this legislation on working mothers and other inhibiting factors as well as further ways, including policy adjustments, of promoting the practice for reference to policy makers and health programme planners.

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Parental perceptions of factors influencing the development of childhood obesity in Brunei Darussalam: A cross-sectional study.

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ABSTRACT

Introduction: Childhood obesity has become a global pandemic as the prevalence has increased over the past few decades. Positive perception and attitude among parents is important in the prevention and management of childhood obesity. This study aimed to investigate the parental perception of factors influencing childhood obesity in Brunei Darussalam. **Materials and Methods**: This is a cross-sectional study conducted from July to September 2016 using random sampling that involved 358 parents from 4 primary schools in Brunei-Muara district in Brunei. The data collection tool used was modified validated questionnaires with themes such as demographic characteristic, parental knowledge of obesity, children eating habits and physical activity and on their children body weight status. **Results**: We found 61.4% and 49.4% parents reported 'inheritance' and 'genetics' as the key contributor to childhood obesity. The majority of parents (80.4%) revealed that their child does not like to eat vegetables because of the taste. Most parents (68.7%) reported their children have sufficient physical activity, despite their children having lower than recommended physical activity (93.0%). Parental fear of crime and traffic dangers are the main barriers to physical activity among children. Most parents (91.8%) did not know how to calculate BMI but 48.1% perceived their children were at their "ideal" weight. **Conclusion**: Inheritance and genetics, children dislike for vegetables and fear of crime and traffic dangers all play a major role in parents perception of contributory factors to their children's obesity. Combined with parental misconception of their children adequate level of physical activity, can influence the development of childhood obesity in Brunei. Thus interventional programmes aimed at reducing childhood obesity should also target parental perception of the above factors contributing to their children's obesity.

Keywords: Childhood obesity, dietary habit, physical activity, child health

INTRODUCTION

The dramatic rising in the global prevalence of childhood obesity with 170 million children under the age of 18 being classified as overweight and obese has been described as a global pandemic. [1] In Brunei, 33.5% of its children are overweight and 18.2% are obese.[2] Similarly, 1 out of 2 of Bruneian children over the age of 5 is either overweight or obese, and the prevalence of childhood obesity has increased from 12% to 18% from 2008 to 2014 in Brunei, showing a dramatic rising of 1% per year. [3]

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Obesity has serious adverse health effects in the long-term such as Type 2 Diabetes, cardiovascular diseases and certain types of cancer as well as adverse psychosocial conditions such as low self-esteem which may lead to anxiety and depression. [4] Active participation of parents with positive attitudes is integral in the prevention and management of childhood obesity as parents play a critical role model in establishing and promoting healthy behaviors in their children. [5,6] However, involving parents would require them to recognize the problems so corrective actions can be initiated. For instance, inability to recognize child's excess weight among parents may lead parents to feel resistant to behavior change and an unsafe neighborhoods as perceived by parents for their child to do physical activities may lead to a preference for indoor activities such as television viewing for their child. [4,7]

Therefore, this study aimed to investigate the parental perception of factors influencing childhood obesity in Brunei Darussalam. Ability to identify these would help in designing an effective parental intervention to prevent, control and manage childhood obesity more effectively.

Materials and methods

Study Design

This is a prospective cross-sectional study conducted from July to September 2016 at 4 primary schools in Brunei-Muara district in Brunei Darussalam. The research data was collected through self-administered structured questionnaire that has been pilot tested prior to the actual study. The demographic characteristics were obtained (including age, race, nationality and highest level of educational attainment) as well as information on parental knowledge about obesity, children eating habits and physical activity and on their children body weight status.

Participants

Parents of Year 4, 5 and 6 primary school children from 4 randomly selected primary schools in Brunei were recruited in the study. The study included all parents with Bruneian nationality. No sampling method was used as all eligible parents were included. Parents with missing data on their questionnaires were excluded from the study.

Study Protocol

The purpose, objective and research procedure of the study were explained via a briefing to the schools' principals and involved teachers. A package containing participant's information sheet, consent form and a questionnaire was distributed to parents via their children by their class teachers. Participants were fully informed about the study, the voluntary nature of participation and their rights to withdraw at any point during the study so that they could make an informed decision before participating in the study. Parents who signed the consent form as well as completed and returned the questionnaires were included in the study.

Statistical Analysis

The sample size was calculated using a sample size calculator based on the proportion of overweight children in Brunei which was 33.5%.[2,8] The required sample size was 343 to achieve 5% precision with 80% power. Taking account of possible 20% non-response rate, the total sample size was 410. The data gathered was analyzed using IBM SPSS, Version 20.0. Descriptive statistics such as frequencies and percentages were used.

Ethical Considerations

Ethical approval for the study was obtained from PAP RSB Institute of Health Science Research and Ethics Committee (PAPIHSREC) and further approval from Ministry of Education to conduct the study at the 4 primary schools. The study was conducted according

to the Declaration of Helsinki Ethical principles for medical research involving Human subjects.[9] Consent was obtained from all participants and their identities will be kept confidential.

Result

A total of 410 parents were recruited and consented but only 358 parents returned their questionnaires, giving a response rate of 87.3%. Forty-two questionnaires were incomplete and these were excluded from analysis. Demographic characteristics of parents participating in the analysis showed that half were fathers and another half were mothers (Table 1). The mean age of parents was 41.6 ±8.1 years old. Racial distribution of parents are shown in Table 1 with majority (95.9%) consisting of Malays. 89.2% of the parents had medium level of education (secondary to Diploma level), 7.0% had higher education (university degrees) and only 3.8% had low education (primary school or none).

Table I. Demographic characteristics of participants (N = 316)

Characteristics	n(%)	Mean(SD)
Relation to child		
Father	157 (49.7)	
Mother	158 (50.0)	
Grandparent	1 (0.3)	
Age		41.56 (8.13)
Race		
Melayu Brunei	276 (87.3)	
Dusun	13 (4.1)	
Kedayan	10 (3.2)	
Murut	4 (1.3)	
Chinese	4 (1.3)	
Others	9 (2.8)	
Nationality		
Brunei Citizen	253 (80.1)	
Permanent Resident	63 (19.9)	
Education		
Primary	12 (3.8)	
Secondary/Diploma	282 (89.2)	
University	22 (7.0)	

Obesity knowledge

A total of 61.4 % of parents considered overweight and obesity as something that is "inherited" and 49.4 % reported genetic as predisposition of body weight. 'Inherited' refers to a trait that is passed down from parent to child whereas 'genetic predisposition' refers to a genetic mutation (occur either randomly or due to some environmental exposure) that alters the genetic instructions of one's genes.

Eating habits

The majority of parents had a good knowledge of the required servings of fruits and vegetables (68.7%), food labeling (78.8%) and food pyramid (89.2%). The top three foods always made available by parents to their children at home are vegetables (46.2%), fruits (28.5%) and processed-meats (17.4%). Parents reported the most important factors considered when buying food as 'safety of food' followed by 'keeping of food (requirement for safe storage of food)', 'preparation of food', 'nutritional values' and 'price of food'. The majority of parents used vegetable oil for cooking at home (83.9%). Almost all parents (98.7%) removed visible fat on their food before consumption during meals. A total of 83.9% of parents carefully watched their child's food portion size (appropriate food portion size for children) and most parents make sure that their children do not eat excessive amount of sweets or greasy food (41.8%). As high as 80.4% of parents stated that their child does not like to eat vegetables because of the taste and 69.6% of them reported that the selling of unhealthy food in school canteen contributed to overweight and obesity among children.

Physical activity and environment

The majority of parents (93%) reported that their children were physically active for less

than 7 days in a week, which did not meet the physical activity standard for children (60 minutes per day, 7 days a week). However, 68.7% of parents reported that their children performed enough physical activity. Both parents (38.9%) and their child (44.3%) spend 1 to 2 hours of screen time (watching television and playing computer games) per day at home.

A total of 53.2% of parents highlighted that their neighborhood is safe. The main environmental barriers for children to do physical activity in their neighborhood as reported by parents were fear of crime, traffic danger, stray dogs and neighborhood parks in poor condition.

Parental perception of child's body weight status

Most parents (91.8%) did not know how to calculate body mass index (BMI) and only half of them (48.1%) perceived their children are at their "ideal" weight. 29.8% of the parents perceived their child to be overweight or obese because they thought that their children have bigger body size.

DISCUSSION

Brunei Darussalam is now facing a rise in non-communicable diseases (NCDs) such as cancer, heart disease, diabetes mellitus and cerebrovascular disease, which accounts for half of the total number of deaths.[2] This is largely driven by a change in dietary and lifestyle patterns which has led to a rise in obesity, a known risk factor for NCDs.[2] To control further increases in obesity prevalence in the future, emphasis in the current prevention and management of childhood obesity is important as obese children are more likely to become obese adults. [10] Parental role in the prevention and management of childhood obesity is crucial as parents are role models for their children in terms of healthy living, exercises and healthy diet. [5,6]

In this study, the majority of parents had medium level of education. There is a complex conundrum between education level and childhood obesity. In western developed countries, numerous studies have shown an inverse relationship between education level with childhood obesity, in that parents with lower education level tended to have children who are obese.[11–13] In contrast, in developing countries, parents with higher education are more likely to have obese children, possibly due to better income and hence better access to food sources. [13,14] This discrepancies between observations in western developed countries and developing countries could also be explained by differences in study design, sampling and other socio-demographic factors.[15]

This study also showed that many parents reported overweight and obesity is "inherited" and controlled by genetics, a findings which is consistent with previously published studies. A study among 52 parents of overweight and obese children aged 4-5 years and 10-11 years in England found that parents felt their children were genetically predisposed to being overweight or obese.[16] Such parental perception of the importance of genetic or inheritance factors in determining childhood obesity is also held by parents in the east as shown by a similar study among Vietnamese mothers.[17] American mothers also perceived that genetic factors played a determinant role in their children's weight regardless of their diet.[18]

This study also revealed that parents perceived their children dislike for vegetables is due to the "taste" of vegetables. This is supported by a study conducted in Australia where 88 parents reported their children's have taste preferences, likes and dislikes towards certain food which influence the food they provide.[19] Similarly, another study among primary school children in Netherlands stated that they do not like vegetables be-

cause of the inherent sensory properties of vegetables, particularly the "taste" and "texture".[20] A review paper found that a child's dietary preferences is a major factor in child's obesogenic dietary intake.[21]

This study also found that the majority of children did not meet the physical activity standard of 60 minutes of moderate-to-vigorous physical activity (MVPA) daily although their parents reported that their children did perform enough. A study carried out in the UK found that parents tended to overestimate their children physical activity and did not see a need for an increase in their child's physical activity.[22] British parents also reported that their children were sufficiently active despite not meeting the physical activity standard.[23] Such parental perception are also held by American parents, particularly in low-income American mothers, that their children were sufficiently active at school and therefore did not always see a need to encourage their children to be physically active outside of school hours. [24,25]

This study also found that parents regard as having no free time and their perception on environmental safety such as fear of crime and traffic dangers as the barriers to physical activity in their children. In developed countries like the United Kingdom and Belgium, parents reported that the lack of a safe neighborhood was the key environmental barriers to physical activity among their children.[22,26] Poor time management and prioritization were also barriers perceived by working parents to their children physical activities. [27]

This study also revealed that almost all parents did not know how to calculate the body mass index of their children and the majority of them perceived their children to be at their "ideal weight". A study from Saudi Arabia reported 90% of parents misclassified their children's weight status by reporting that their overweight and obese child had normal weight.[28] In addition, 60.9% of overweight and obese children in Poland were perceived as having normal weight by their parents and 13.3% of the parents actually thought that their normal-weight children were underweight.[29] Parental misconception of their children's weight as shown by these studies and our own study indicate that such misconceptions are perhaps universal. Although various studies on misclassification of weight status have been identified in literature, currently there is very little evidence to explain these. A review demonstrated some potential explanations to be fear of being judged, unwillingness to label a child as overweight, and shifting perceptions of normal weight because of increases in body weight at a societal level.[30] We also hypothesize that cultural norms in this population may value children with rounder shape, perhaps as a sign of health.

This study has some limitations. First, the majority of the participants in the study were Malay so the result is not generalizable across all ethnic groups. Secondly, children's BMI were not taken to validate parental perception of their children's weight status. In addition, parental BMI was also not taken so the association between parental perception of risk factors and childhood obesity cannot be established. Lastly, interpretation of the findings must be made with caution due to the cross-sectional nature of the study so future longitudinal studies are suggested to establish the temporal nature and causality of associations.

In conclusion, this study has identified important factors for addressing childhood obesity in Brunei. It is crucial to address parental understanding of the contributing factors to childhood obesity with implementation of extensive and effective public health educational programmes by public health professionals and educators. The misconceptions among Bruneian parents regarding their child's

weight status may be explored further in future studies. Policy makers and urban planners may also utilize this study findings to ensure neighbourhood safety to increase the level of physical activity in community settings. Overall, this study findings may be valuable for public health professionals in planning and developing tailored interventional programmes for parents and in designing conducive environment to promote physical activity for children and their families in Brunei.

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Conflict of interest

The Author(s) declare(s) that there is no conflict of interest.

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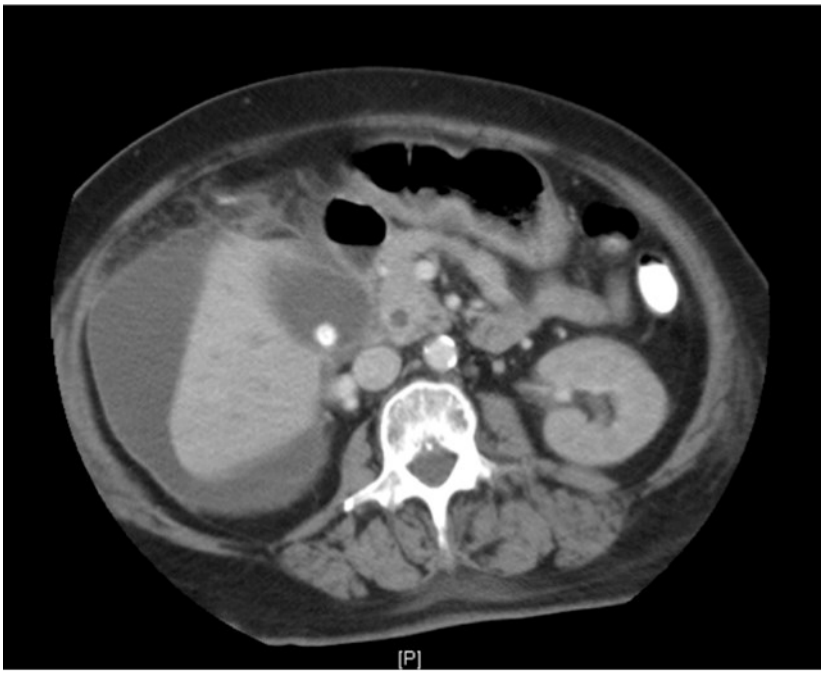
Zainal Adwin ZAINAL ABIDIN



A 65-year-old lady presented with a 3-day history of high-grade fever, right hypochondrium pain and jaundice. Clinically she was septic and biochemically it showed features of biliary obstruction A computed tomography scan of the abdomen was performed

What is the diagnosis?

Answer: refer to page 41

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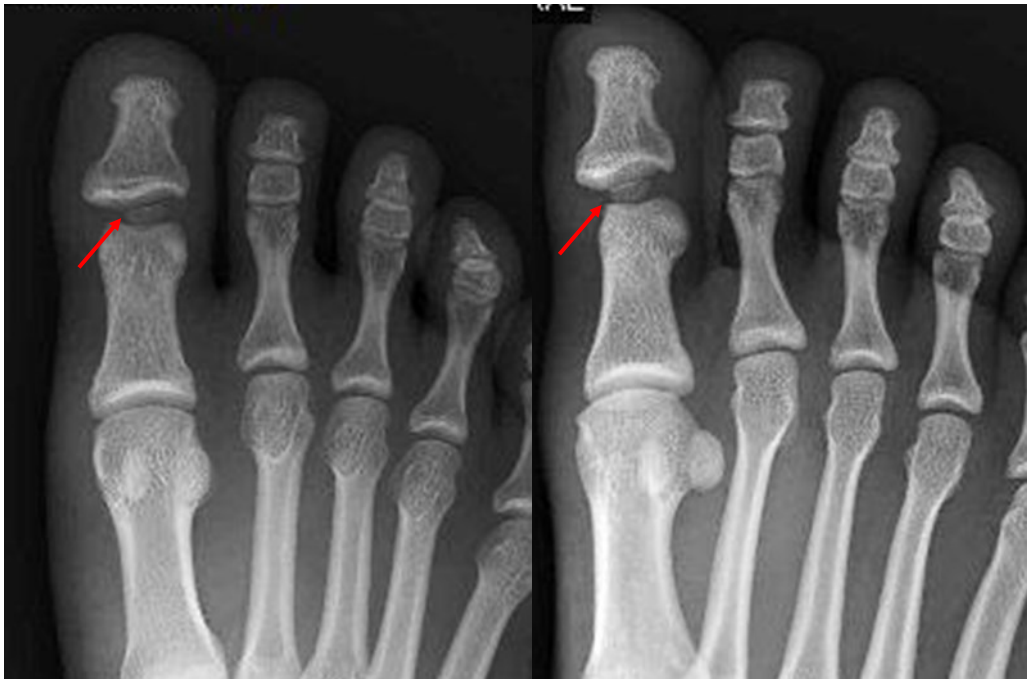
Shaifuzain AB-RAHMAN and Mohd Imran YUSUF



A 19-year-old man was seen at the orthopedic outpatient clinic for painful right big toe, 8 days after a motor vehicle accident (MVA). The pain and swelling of the right big toe has not improved since the MVA causing the patient to seek further treatment. Clinical assessment showed swollen right big toe which was tender to touch. There was no significant deformity noted. Review of plain radiograph of the right foot is diagnostic.

What is diagnosis?

***Answer**: refer to page 42*

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Post adenotonsillectomy pneumomediastinum and subcutaneous emphysema: A rare complication of a common procedure.

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ABSTRACT

Cervicofacial and pneumomediastinum subcutaneous emphysema is a very rare complication of adenotonsillectomy procedure. Even though it is a self limiting complication and can be treated conservatively, it can alarming for the patient or patient's family as well as leading to more serious and fatal consequences occurring from tension pneumomediastinum. We report a case of incidental finding of pneumomediastinum in postadenotonsillectomy patient. He was managed conservatively and made an uneventful recovery.

Keywords: tonsillectomy, subcutaneous emphysema, complication

INTRODUCTION

Adenotonsillectomy is a common surgical procedure among paediatric age group. It is relatively a safe procedure with minimal complications. Common complications are intraoperative or postoperative haemorrhage, infection, damaged to soft tissue and surrounding structure such as teeth, odynophagia and oropharyngeal edema.[1] Cervicofacial and pneumomediastinum subcutaneous emphysema is a very rare complication. We presented a case of pneumomediastinum subcutaneous emphysema following adenotonsillectomy in Malaysia.

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Case Report

A 12 year old boy was admitted to our Ear, Nose and Throat (ENT) ward for elective surgery of adenotonsillectomy. The indication for surgery was recurrent attacks of acute tonsillitis. He had underlying Allergic Rhinitis and Bronchial Asthma.

Patient was given general anaesthesia with fentanyl, propofol and cisatracium during induction. He was intubated with endotracheal tube, REA size 7mm without any difficulty by anaesthesiology team. Intraoperative findings was fibrotic bilateral tonsils (grade 3) and 50% adenoid hypertrophy. Both tonsils were separated from tonsillar the bed using cold instrument dissection technique and inferior pole was released using tonsillar snare. Adenoid was removed using conventional adenoid

curettage technique. Haemostasis then was secured with bipolar diathermy.

Within 12 hours post surgery, patient developed fever at 38 degree Celcius. There were neither upper respiratory tract symptoms such as cough nor active hemorrhage. On day 2 post surgery, patient recovered from fever and was discharged well. However, about 12 hours after discharge, patient was brought to Accident and Emergency Department by his mother, who noted the presence of crepitus over the neck region of her son. He has no obvious neck swelling, difficulty in breathing, chest pain, odynophagia or dysphagia.

Examination by the attending ENT medical officer revealed generalized subcutaneous crepitus all around the neck from the jaw till upper chest region. The tonsillar fossae were covered with slough, there was no blood clot or active bleeding. He was afebrile and all vital signs were stable. Flexible nasoendoscopy was performed to ensure that the airway was not compromised and was found to be normal.

Soft tissue neck radiograph showed extensive subcutaneous emphysema in the neck and both supraclavicular regions with presence of pneumomediastinum. There was no pneumothorax seen. (Fig 1, 2). Patient was admitted to intensive care unit (ICU) for close observation. He was put on high flow mask oxygen and started on intravenous antibiotic. Since patient did not have odynophagia or dysphagia, he was allowed to take oral diet with intravenous fluid as maintenance. After 3 days of ICU monitoring, the crepitus around the neck has resolved and repeated soft tissue neck radiograph confirmed resolution of the pneumomediastinum and subcutaneous surgical emphysema. He was once again discharged home in a well condition.

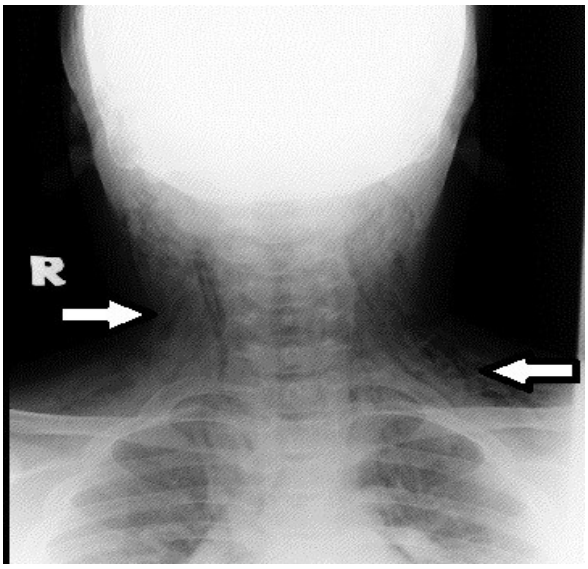

Figure 1: Post-operative day 2 AP view of soft tissue neck radiograph. Arrows show bilateral supraclavicular subcutaneous emphysema.

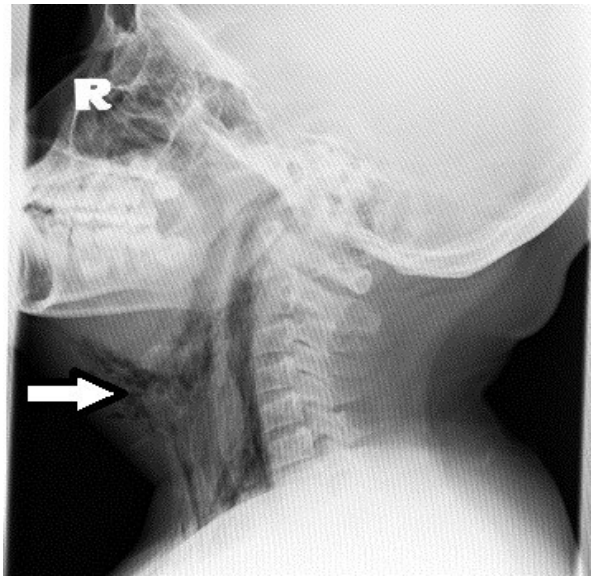

Figure 2: Post-operative day 2 Lateral view of soft tissue neck radiograph. Arrows show extensive cervical subcutaneous emphysema

Discussion

Adenotonsillectomy is a safe surgery with minimal complications.[1] A retrospective case-controlled study done by James Belyea et al in 2013 found that out of 127 children under 3 years old who underwent adenotonsillectomy, the early complications were respiratory related such as bronchospams and pulmonary oedema (3.1%) and the late complications were due to dehydration and haemorrhage (6.3%)

which required readmission of patient.[2] The other possible complications are infection, teeth damage, pharyngeal oedema and odynophagia.[1] However, a cervicofascial or pneumomediastinum subcutaneous emphysema is a very rare complication.

Our patient was well preoperatively and the intubation as well as extubation procedure was uneventful. Post operatively, patient developed reactive fever due to inflammatory reaction.[3] As the fever developed within 12 hours without symptoms of upper respiratory tract infection (URTI), or active bleeding, thus no antibiotic was started. At home, he has no fever, tolerating orally well and no URTI symptoms. He did not complaint of neck pain or odynophagia.

Normally patient with subcutaneous emphysema post adenotonsillectomy will present with neck swelling, pain, difficulty of breathing, dysphagia or odynophagia as reported in other literature review.[1,4,5,6] However, in this case, the patient did not experience the above symptoms possibly due to early detection of subcutaneous crepitus by his mother who is a paramedic. He also did not give a history of straining, performing valsalva manoeuver or coughing prior to the event.

The exact pathophysiology of subcutaneous emphysema post adenotonsillectomy surgery is not well understood but it has been postulated that, it could be due to breach of the tonsillar fossa bed during the surgery. This will lead to air escaping into the parapharyngeal and retropharyngeal spaces and subsequently into the subcutaneous tissue of the mediastinum. This condition may be precipitated by coughing or vomiting during extubation. [1,4,5] Apart from that, excessive positive pressure ventilation may worsen the condition by causing the ventilated gas to spread subcutaneously.[1]

As in our case, vigorous dissection of the tonsillar bed in case of fibrotic tonsil or adhesion may lead to breach of the tonsillar fossa bed which could be the only possible explanation for the resulting pneumomediastinum and cervical subcutaneous emphysema. Small or minor mucosal breach may not be apparent, thus easily missed intraoperatively. Ideally if it is noted intraoperatively, repair of the breach mucosa should be done in the same operative setting to prevent subcutaneous surgical emphysema from developing as a post-operative complication. Apart from the surgical procedure itself, trauma due to intubation may also cause breach to the oropharyngeal mucosa and subsequent surgical emphysema.

Cervicofacial or penumomediastinum emphysema is usually a self limiting and can be treated conservatively. Usually it will resolved spontaneously after several days.[9] For non serious and stable cases such as our case, it can be treated conservatively, supplemental oxygen may facilitate nitrogen absorption from emphysematous air and hastened the recovery. Patient should be advice to avoid straining or doing valsalva manoeuver. Coughing or vomiting should be treated respectively with antitussive or antiemetics. Intravenous antibiotic should be started to prevent infection. If there is any evidence of mucosa tear during endoscopic examination, patient should be taken back for surgical repair of the torn mucosal.

In severe cases of undetected pneumomediastinum, the increasing pressure may potentially lead to tension and cardiopulmonary collapsed can occur. In a literature review of cervicofacial subcutaneous emphysema, Al Jabr et al reported 14 cases, four of which required aggressive surgical management such as tracheostomy in 2 patients, thoracotomy in another and one patient required intubation and ventilation.[1]

In conclusion, although rare, risk of cervicofacial and pneumomediastinum subcutaneous emphysema should be explained to patient and parents during preoperative counselling. Even though it is a self-limiting complication, if detected, patients should be closely monitored for more serious complication of tension pneumomediastinum or mediastinal infection. Intraoperatively, precaution should be taken in cases of fibrotic tonsils to avoid excessive dissection which can lead to breach of the tonsillar fossa bed and thus subsequently development of subcutaneous emphysema. Anticipated difficult adenotonsillectomy cases should be performed with supervision from senior surgeons and patient should be kept at least 48 hours post operatively to observe for rare complication such in this case.

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Acute haemolysis secondary to low dose of intravenous immunoglobulins

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ABSTRACT

Intravenous immunoglobulin is beneficial in treating lupus nephritis at various stages of treatment. It is generally well tolerated with mild and transient side effects. We report a case of a young man with recalcitrant lupus nephritis who was treated with three courses of intravenous immunoglobulin of 100 grams, 60 grams and 15 grams respectively within 5 months. During the last course, he developed acute haemolysis on day 3 of treatment; haemoglobin dropped by 3 grams, elevated lactate dehydrogenase, reticulocytosis and haemoglobinuria. Full blood picture revealed typical haemolysis findings. Immediate improvement was observed after stopping the immunoglobulin and with transfusion of 2 pints of packed cell.

Keywords: systemic lupus erythematosus, lupus nephritis, immune thrombocytopenic purpura, immunoglobulin

INTRODUCTION

Intravenous immunoglobulin (IVIG) is a valuable fractionated blood product that contains > 90% of IgG and 10% of Ig M and IgA. It is widely used in various spectrums of autoimmune diseases including systemic lupus erythematosus (SLE) with or without renal involvement.[1] In Lupus Nephritis (LN), IVIG has been demonstrated to be beneficial at various stages of treatment.[1] At present there is no consensus on the IVIG dosing intervals and treatment duration. The most commonly used is 400mg/kg/day in 4-5 divided doses (high dose). Even though there are centres reported beneficial effects with a low dose regimen (85mg/kg/day in 4-5 divided doses), it was commonly associated with poor response on thrombocytopenia, alopecia, vasculitic and proteinuria.[2] Generally, IVIG is well tolerated with mild and transient side effects. However, severe anaphylactic reactions, acute renal kidney injury, thromboembolic events, aseptic meningitis, neutropenia, pseudo-hyponatremia and autoimmune haemolytic anaemia (AIHA) have been reported in rare cases.[3] Significant haemolysis is reported to be between 1.6 to 6.7 % although the true incidence may be higher due to unreported cases of low degree haemolysis.[4] Most of the reported haemolysis was observed with high dose of IVIG. Here we report a case of acute haemolysis in a young man with refractory LN who received a total of 15 grams of IVIG (~0.2gram/kg).

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CASE HISTORY

A 33-year-old man was diagnosed with SLE in 1998 with cerebral lupus and musculoskeletal

involvement. He was treated with high dose steroids, hydroxychloroquine and maintained with low dose steroid thereafter. He developed LN a year later requiring higher steroid dose and cyclophosphamide therapy followed by maintenance with cyclosporine A, azathioprine and low dose prednisolone. He achieved full remission with normal renal function and complete resolution of proteinuria.

Subsequently he developed multiple relapses of LN with/out autoimmune haemolytic anaemia in March 2004, May 2007, February 2009 and October 2011. During his last relapsed in 2011, intravenous cyclophosphamide was recommenced however it was prematurely terminated due to the development of left leg *Pseudomonas spp* cellulitis. Despite completed 6 week course of anti-pseudomonal antibiotic, he was readmitted in Jan 2012 with progressive severe nephrotic state with anasarca with autoimmune haemolytic anaemia precipitated by candidaemia. He also developed hospital acquired pneumonia and new areas of cellulitis due to *staphlococcus aureus* septicaemia and needed prolonged course of antibiotic and antifungal. He was covered with steroid of 1mg/ kg with IVIG 20grams/ day for 5 days. In March 2012, he developed sudden cortical blindness due to retinal vasculitis and developed recurrent seizure due to cerebral lupus. He was pulsed with low doses of IV methylprednisolone for 3 days, IVIG 20 grams daily for 3 days and commenced on IV rituximab 500 mg weekly for 6 doses. His vision improved and his renal function remained stable with creatinine of 200 umol/L despite persistent heavy proteinuria.

Two months later he presented with recurrent pseudomonas septicaemia with septicemic shock. His serum creatinine doubled, became oliguric and eventually requiring haemodialysis support. Clinically he remained in a severe nephrotic state with anasarca. He was started with intravenous immunoglobulin on 11/5/2012 (5g twice/day) and 24 hours after receiving a total IVIG dose of 15grams, he was noted to have dark coloured urine and his haemoglobin level dropped from 10.4 g/dL to 7.6g/dL. His serum LDH was 2416 IU/L, Direct Coomb's Test was positive, peripheral blood smear showed reticulocytosis with spherocytes (Fig 1) and urine for haemoglobin tested positive (Fig 2). IVIG was discontinued and 5 days later his urine became clear and haemoglobin stabilised at 10-11 g/dL after transfusion of 2 pints of packed red cell.

DISCUSSION

There are numerous literatures reporting the beneficial effects of IVIG in the treatment of LN[1]. However to date, it is mainly anecdotal. No solid recommendation available on the use of IVIG in LN treatment. The existing data demonstrated varied practices with the use of IVIG as part of induction protocol, whilst the others demonstrated its efficacy for maintenance or as a salvage regimen.[1] In our practice as described in this case, IVIG is being used primarily as a second line therapy in LN patients who failed the standard regimen with high dose corticosteroid and cyclophosphamide therapy or may be considered as a first line in conjunction with high dose corticosteroid in patients with concomitant autoimmune haemolytic anaemia due to active SLE.

Acute haemolysis has been increasingly recognized complication of IVIG. Recipients who are at high risk includes highly sensitized HLA patients or patients with underlying inflammatory state, non-O blood group especially blood group A, and higher titres of anti A/B in IVIG content.[5] There is no gender preponderance but one case series describes female predominance.[6]

IVIG related haemolysis is defined when haemolysis occurs within 10 days of IVIG exposure together with a positive direct antiglobulin test (DAT) and presence of at least two of other biochemical tests including

reticulocytosis, significant spherocytosis, elevated LDH, haemoglobinaemia, haemoglobinuria, unconjugated hyperbilirubinaemia and low haptoglobulin levels. Most of the mentioned features were present in our patient except for a DAT which we didn't perform as the haemolysis evidence was classical. Based on the severity of grading, our patient would fall into the grade 2 category with a reduction of 3 grams in haemoglobin with the baseline of > 10g/dL.

A double hit mechanism has been proposed as a cause of haemolysis. Haemagglutination of red blood cells in the recipient following a passive transfer of anti A and anti B from IVIG were constituted the first hit whereas in the second hit it was believed due to accelerated removal of the sensitized red cells in patients with underlying inflammatory state.[6] Haemolysis was postulated will only be clinically significant when there is sufficient amount of anti A and anti B to activate complement with a sufficiently over-activated reticuloendothelial system.[5] Thus, it explains why acute haemolysis was normally seen with high dose of IVIG. In our case, we believe apart from the second hit phenomenon, the amount of anti A and anti B from 3 different courses of IVIG could have been accumulated and be sufficient enough to cause haemagglutinin during the third course of therapy despite lower doses compared to the reported literature. Furthermore he is blood group A positive which put him in the high risk category.

Once the haemolysis is recognized, the principle of management is by immediately stopping IVIG therapy. Replacement of blood group O transfusion has been recommended to prevent further antigen- antibody reaction in patients who had a positive DAT. In preventing haemolysis, there are strict recommendations on the preparation of IVIG which include the selection of donors, ratio of types of plasma, removal of haemagglutinins, production of blood group specific products, rejection of batches with high agglutinins titres and cross matching with the recipient.[5] For patients with morbid obesity, a policy of ceiling dose of IVIG is advisable.

CONCLUSION

With widely use of IVIG regardless of the disease indication, the clinician should aware of acute haemolysis even at low doses as it is potentially life threatening and patient receiving IVIG should be monitored for any reaction during the treatment.

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Outcomes of Endoscopic Balloon Dilatation for acquired laryngotracheal stenosis in Pediatrics Patients:UKMMC Early Experience

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ABSTRACT

Laryngotracheal stenosis is abnormal narrowing of airway which may be congenital or acquire. Laryngotracheal stenosis in children mostly comprised of the acquired form whereby endotracheal intubation is the commonest etiology. The mainstay of treatment remains a challenge to many otorhinolaryngologists. Four pediatric patients aged less than 13 years underwent balloon dilatation for acquired laryngotracheal stenosis in Universiti Kebangsaan Malaysia Medical Centre from 2000 to 2016. Mean follow up duration was 18 months. All patients showed positive early outcomes whereby tracheostomy was successfully decannulated and open surgery was avoided. We conclude that endoscopic balloon dilatation is useful in acquired pediatric laryngotracheal stenosis.

Keywords: Subglottic stenosis, tracheal stenosis, balloon dilatation

INTRODUCTION

Most pediatric laryngotracheal stenosis are acquired comprising 95% of all cases with only 5% are of congenital origin[1]. Intubation is the commonest etiology for acquired pediatric laryngotracheal stenosis (APLTS).[2] The incidence of subglottic stenosis (SGS) in intubated neonates and children of 5 years and below is estimated at 1% to 2% and 11% respectively.[3] The risk of developing SGS increases by 50% for every five days of intubation.[3] Cotton-Myer grading describing the severity of stenosis was proposed by Myer et al in 1994.[4]

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In 1991, balloon dilatation in children with laryngeal stenosis was reported by Hebra *et al* to be less traumatic as compared to bougienage dilation. [5] Since then it has progressively gain its popularity among the surgeons. We report our early experience with four patients who showed promising outcomes after undergoing balloon dilatation.

Case Series

Patient 1

This was a five year girl who was intubated for status epilepticus. Immediately following extubation, patient developed stridor with respiratory distress and was re-intubated twice in two w eeks duration. Tracheostomy was performed and the patient was referred to our centre. Direct laryngotracheoscopy was performed which showed SGS Cotton-Myer

grade 3 with thin, matured and circumferential scar. Vocal cords were mobile and there were no features of laryngotracheomalacia or bronchomalacia. The stenotic segment was incised with CO2 laser and endoscopic balloon dilatation was performed with balloon size 7 (Inspira Air, USA) with the pressure of 12ATM. Intralesional Triamcinolone acetate (10%) was injected at the stenotic segments. Patient was discharged the following day and no postoperative systemic steroids were given.

Second balloon dilatation was performed five weeks later and achieving an improved Cotton-Myer grading of grade 2. The 3rd balloon dilatation was carried out at 30 weeks following the second dilatation and again with a good outcome. Patient's tracheostomy was successfully decannulated five weeks after.

Patient 2

This is a five year girl who was intubated for respiratory distress secondary to bibasal lung abscess. Multiple attempts of extubation failed and a tracheostomy was performed after 23 days. The patient was referred to our centre and she underwent direct laryngotracheoscopy and bougie dilation at two settings. Findings at that time were SGS Cotton-Myer grade 4, with a thick and matured scar.

Four months later, she underwent a third procedure whereby the findings were of SGS Cotton-Myer grade 3, again with a thick and matured scar. This time, balloon dilatation was performed using balloon size 7 (Inspira Air, USA) with pressure of 14 ATM over 1 minute. Mitomycin C 2mg was applied at the raw area. Patient then defaulted follow up.

After a year and half, patient represented and reassessment of airway under general anaesthesia revealed tremendously improved airway, a repeat procedure was unnecessary and patient was successfully decannulated of her tracheostomy.

Patient 3

This was a 23 months old male infant who was admitted with hemolytic uremic syndrome secondary to right lung empyema. Patient was intubated for 22 days and developed respiratory distress following extubation. Direct laryngotracheoscopy was performed and revealed a thin segment tracheal stenosis Cotton-Myer 3. Balloon dilatation was performed using balloon size 7mm (Inspira Air, USA), at 14 ATM pressure for a total of 2 minutes. Intralesional Triamcinolone acetate (10%) was injected at the stenotic segments. Patient was extubated the next day and remained asymptomatic. Repeat laryngotracheoscopy six weeks later revealed no residual stenosis and a repeat procedure was deemed unnecessary.

He was regularly reviewed in the outpatient clinic and at one year post procedure , he was found to be well and free of symptoms.

Patient 4

This was a ten months old premature infant who was intubated for six days for respiratory distress syndrome and was nursed in NICU for two months. One month later, child developed stridor, with breathing difficulty and poor oral intake. Child was intubated and direct laryngotracheoscopy was performed. Subglottic cyst seen on the left posterolateral wall and marupilization was done. Subsequently, patient had multiple admissions with similar presentations requiring intubation. Direct laryngotracheoscopy showed SGS cotton-Myer 3 and patient underwent balloon dilatation using balloon size 5 (Inspira Air, USA), maximum pressure at 18mmH2O for 90 seconds. Intralesional Triamcinolone acetate (10%) was injected at the stenotic segments.

Second balloon dilatation was performed five weeks apart using balloon size 7 (Inspira Air, USA) with pressure at 16mmH2O for 90 seconds. Intralesional Triamcinolone acetate (10%) was injected at the stenotic segments. Findings at that time were SGS Cotton-Myer 2. Patient was nursed postoperatively without the need of intubation.

During clinic follow ups, flexible nasopharyngolaryngoscopy showed no residual SGS at one, two, six and twelve months post procedure.Currently, she has stable airway for 14 months since the last balloon dilatation.

A total of four children ranging from ten months old to five years old had undergone balloon dilatation for laryngotracheal stenosis. Three patients had SGS and one had tracheal stenosis. Intubation being the commonest etiology while one preterm patient had concomitant subglottic cyst. Using Cotton -Myer grading, one patient Cotton-Myer grade 2 and 3 patients with grade 3. Two patients underwent balloon dilatation once, one patient underwent twice, and one patient underwent thrice. Two children had tracheostomy prior to balloon dilatation.

All patients who underwent balloon dilatation in our centre have positive outcomes. There were significant improvements of Cotton-Myer grading in between endoscopic dilations as compared to bouginage dilatation methods. Patients who underwent endoscopic balloon dilatation had shorter stay in the intensive care unit and required lesser duration of post operative endotracheal intubation.

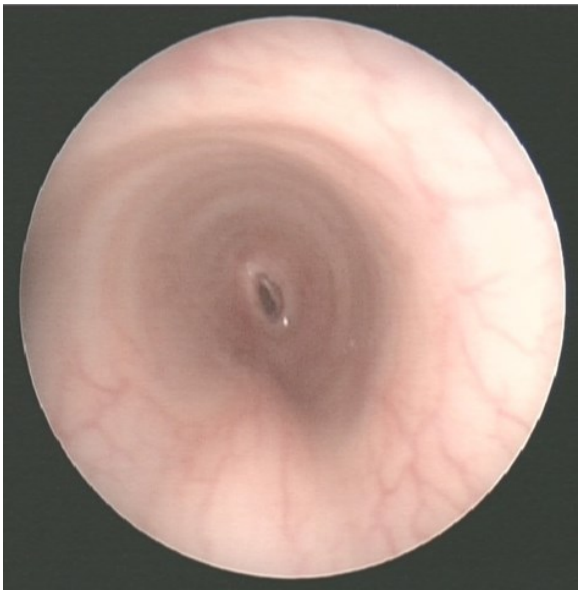

Figure 1: Tracheal stenosis Cotton-Myer Grade 3 before endoscopic balloon laryngotracheoplasty

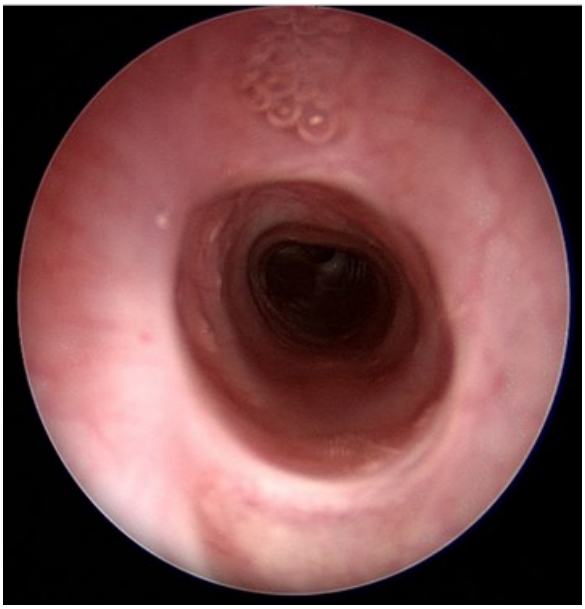

Figure 2: Tracheal stenosis Cotton-Myer Grade 1 post endoscopic balloon laryngotracheoplasty.

Discussion

The management of laryngotracheal stenosis in children remains as a challenge for otorhinolaryngologist. Various management options were popularized, vary from adjuvant therapy with Mitomycin C and intralesional steroids injection, endoscopic cold instrument and laser excision, and also open reconstructive surgery. Currently, with the advantages of balloon dilatation, it has gained popularity among surgeons in managing SGS in the pediatric population.

Table 1: Demographic characteristics and outcome of endoscopic balloon dilation laryngotracheoplasty in pediatric patients.

	Patient 1	Patient 2	Patient 3	Patient 4
Age	5 years 2 months	5 years	1 year 11 months	10 months
Gender	Female	Female	Male	Female
Etiology	Intubation x 3, 7 days (in total)	Intubation x 1, 22 days	Intubation x 1, 22 days	Intubation x 2, 6 days (Subglottic cyst)
Location of Stenotic segment	Subglottis	Subglottis	Trachea	Subglottis
Previous tracheostomy	Yes	Yes	No	No
Type of stenosis and Cotton Myer grading	Grade 3 Mature Thin circumferencial	Grade 3 Mature Thin Anterior part	Grade 3 Inmature Thin circumferencial	Grade 2 Inmature Thin circumferencial
Number of dilation	3	1	1	2
Balloon size (mm)	7	7	7	1st-5/2nd-7
Clinical improvement in 24 hrs	Yes	Yes	Yes	Yes
Success: Avoidance of open surgery/ decannulation	Yes	Yes	Yes	Yes
Follow up duration (months)	17	34	4	19

Endotracheal intubation remains as the major cause of laryngotracheal stenosis as it imposed an insult from the tube cuff leading to fibrosis.[2,6] Balloon dilatation exerts only the radial directed forces on the mucosa as compared to the traumatic shearing forces seen in bougienage dilation which can cause further scarring.[5] The balloon exerts maximal radial pressure to enable a controlled dilation over a small surface area. The bougienage dilation requires multiple insertions of bougie dilators gradually from smaller to larger sizes.[7] Hence balloon dilatation has the advantage of reducing significant mucosal trauma.

Balloon is inserted under direct vision using a telescope whereas bougie dilators are inserted as a blind procedure with a higher risk of trauma to surrounding structures.[8] Moreover, the nature of the balloon being inserted in a risk of trauma to surrounding structures.[8] Moreover, the nature of the balloon being inserted in a deflated manner has the advantage over bougie dilators to be able to pass through the narrow glottis and subglottis in pediatric population with a lesser risk of cricoarytenoid joint dislocation. With these advantages, balloon dilatation is thought to be superior to bougienage dilation.

In the review of Jiovani et al, the recommended balloon size used in treating pediatric acquired airway stenosis should not exceed age-appropriate diameter by 1mm.[9] However, only balloon size 5 and 7 were available at our centre. Successful dilations were achieved without complications despite using balloon out of recommended sizes. Endoscopic balloon dilation is less invasive. Hence, it is better tolerated especially among preterms and critically ill infants as they would not survive a major operation.[7]

In our review, all patients who had undergone balloon dilatation for acquired airway stenosis had good early outcomes. All patients showed significant clinical improvement and better Cotton-Myer gradings. There was no complication following balloon dilation

in all patients.

Conclusion

Endoscopic balloon dilation is an effective and safe treatment modality in relieving airway obstruction from acquired pediatric laryngotracheal stenosis but may require repeat dilatation. It is a less invasive form of surgery and can also help in avoiding potential morbidities of open surgery.

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(*Refer to page 27)*

ANSWER : Spontaneous biloma due to a floating common bile duct calculus

The above patient had a spontaneous biloma. It was associated with a floating calculus in her common bile duct. The calculus has produced an increase in the intra-ductal pressure and caused this rather large collection.

Spontaneous biloma has been coined to explain the phenomenon when a biloma occurs without any invasive procedures. It is commonly associated with choledocholithiasis and is postulated to occur due to raised intraductal pressure as a result from the obstruction to the CBD from calculus, tumour and also spasm of the sphincter of Oddi[1,2]. Bilomas are most common at the subphrenic and subhepatic region. Subcapsular bilomas are less common and are usually associated with abdominal surgery or trauma.

In the present case, the cause of the obstruction was probably choledocholithiasis with increased intraductal pressure. This is compounded by poor parenchymal support for distal biliary radicals which can cause subcapsular leakage.

Imaging investigations are integral in diagnosing and managing bilomas. Ultrasonography is the most sensitive modality to detect a biloma but is operator dependent. Computed tomography is optimal for assessing and delineating bilomas. It can measure the dimensions, the probable content of the collection and the underlying cause[3]. Computed tomography may also rule out other differential diagnosis such as hematomas, seroma, liver abscess, cysts and pseudocysts. Bilomas are usually measured less than 20 hounsfield units (HU)[3]. Radiological guided drainage is the preferred treatment. The contents must be inspected to rule out infection and it must be sent for bilirubin analysis to confirm the diagnosis.

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(*Refer to page 28*)

ANSWER : Neglected incarcerated sesamoid of interphalangeal joint (IPJ) of big toe

The sesamoid bone or hallucal sesamoid of the interphalangeal joint (IPJ) of big toe is considered to be anatomical rarity and its presence may be overlooked due to its clinical insignificance. Depending on studies, the presence of a single hallucal interphalangeal sesamoid varies from 4.3% to 7.8% in adults[1,3]. The rarity of the hallucal sesamoid and its clinical insignificance may contribute to initial misdiagnosis in patients with incarcerated sesamoid within the IPJ following the IPJ dislocation.

Closed manual reduction should be attempted first although outcomes may not be promising in majority of cases[2-4]. The presence of interphalangeal sesamoid complicates the success of full reduction after an IPJ dislocation.

In general, the IPJ of big toe is a stable saddle joint. It is generally stabilized by the collateral ligaments, surrounding tendons & plantar accessory ligaments, thus dislocation of IPJ of a big toe is rare. Irreducible IPJ following dislocation is even rarer and is usually attributed to anatomical abnormality such as incarcerated hallucal sesamoid[2,3].

There are 2 types of IPJ dislocation of big toe. In Miki type I, the volar plate is displaced into the IPJ causing the IPJ to widen and subluxed together with the sesamoid bone if it is present. The rebound flexion and present of intact collateral ligaments trapped the sesamoid or volar plate in situ. Clinically, other than pain and slightly elongated big toe, there is little or minimal deformity noted. In Miki type II, the volar plate is completely displaced posteriorly causing the distal phalanx to hyperextend and dislocate dorsally[4].

CT scan is more sensitive for diagnosing the incarcerated hallucal sesamoid of the IPJ of big toe, however a proper plain X-ray with true AP and lateral view is usually sufficient to come up with the diagnosis. A proper post-reduction radiograph assessment is crucial because occasionally irreducible IPJ with incarcerated sesamoid may be missed by untrained personnel.

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Letter to Editor in response to the article by Ahmad Adam et. al on "Prevalance of obesity and overweight among doctors in Brunei Darussalam" (August 2016, Volume 12 Issue 4)

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Dear Editor,
I read with interest the article by Ahmad Adam et. al. on "Prevalence of obesity and overweight among doctors in Brunei Darussalam". Indeed, obesity is a major problem being faced by both developing and developed countries.[1,2] From a worldwide population mean of 33% that are either overweight or obese in 2005, this figure will jump to a staggering 57.8% or 3.3 billion people in 2030.[3] Looking at the figures in Brunei doctors' alone, this numbers are truly realistic predictions.

The wide availability of fast food restaurants that are operational round the clock and tech-crazy populations that hardly exercises have nevertheless contributed to this menace. World Health Organization in 2003 through its Technical Report Series outlined the following strategies in tackling obesity which includes[5]:

a. Dietary intervention for eg. scrutinizing fat, fibre and free sugar intake
b. Encouragement of increased physical activities
c. Encouragement of future research into obesity

The challenges that lie ahead seems difficult to scale, but with the co-operation of all stakeholders, including the policymakers, success may at last see the light at the end of the tunnel.

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