

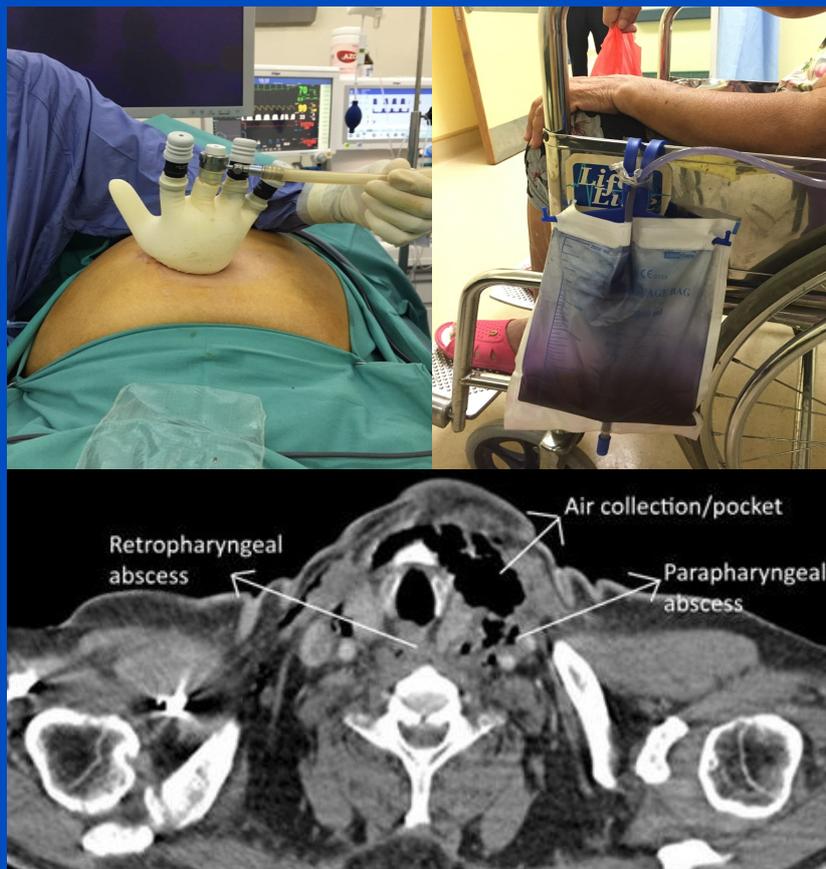


OFFICIAL PUBLICATION OF
THE MINISTRY OF HEALTH,
BRUNEI DARUSSALAM

Brunei International Medical Journal

Volume 13, Issue 5

15 October 2017 (25 Muharram 1439H)



Brunei International Medical Journal (BIMJ) Official Publication of the Ministry of Health, Brunei Darussalam

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Prevalence of Cardiovascular Disease Risk Factors with Stratification of Ten-Year Total Cardiovascular Risk Among the Working Adults in Brunei Darussalam .

SSL CHIEW ¹ NAA TUAH, ^{1,2,3}; ASC LAI, ^{1,4}, A YAZDI ³, A MAJEED ³, Z WINT ¹

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ABSTRACT

Background: Globally, cardiovascular diseases (CVD) are rising and Brunei Darussalam is no exception to the trend. However, information regarding CVD risk factors and cardiovascular risk assessment are limited particularly among the working adults. Therefore, this study aimed to estimate the prevalence of CVD risk factors with stratification of 10-year total cardiovascular risk among the working adults in Brunei Darussalam. **Methods:** This retrospective, cross-sectional analysis included data from a randomly selected sample of 1375 subjects aged 40-60 years from the Occupational Health Division, Ministry of Health Brunei Darussalam between 2010-2014. Prevalence of modifiable cardiovascular risk factors was determined and the ten-year cardiovascular risk of the subjects was calculated using the WHO/ISH risk prediction charts. **Results:** The prevalence of hypertension, hypercholesterolemia, obesity, smoking and diabetes was 49%, 36%, 26%, 21% and 18% respectively. Multiple logistic regression analysis showed three models were statistically significant: age with smoking and hypercholesterolemia ($p=0.002$ and $p=0.038$); gender with smoking, hypercholesterolemia and obesity ($p=0.046$, $p<0.001$ and $p=0.013$); and Malay ethnicity with smoking, hypercholesterolemia and obesity ($p<0.001$, $p=0.005$ and $p<0.001$). After adjusting for age and gender, males were 3.37 times more likely to smoke and 1.62 times more likely to have hypercholesterolemia, while females were 2.85 times more likely to be obese. The WHO/ISH risk prediction charts identified two percent of the study population as having moderate and high risks of developing CVD events in ten years. **Conclusion:** This study indicated high prevalence of modifiable CVD risk factors particularly hypercholesterolemia and obesity among this working population which suggests routine screening with implementation of healthy lifestyle modification programmes are warranted.

Keywords: Cardiovascular disease risk factors, Hypertension, Smoking, Obesity, Hypercholesterolemia, Diabetes, Cardiovascular risk assessment

INTRODUCTION

Cardiovascular disease (CVD) is the global leading cause of mortality and it is projected

to increase from 17.5 million to 24 million deaths by 2030.¹ Over 80% of CVD mortality occurred in developing countries, where premature deaths from heart attack and stroke were higher among those under the age of 60 years compared to the developed

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countries (58% vs 20%).² The burden of CVD is largely caused by increasing prevalence of cardiovascular risk factors including tobacco use, hypertension, hypercholesterolemia, and diabetes.³ The risk of CVD such as heart disease and stroke can be reduced through two approaches: the single risk factor approach in managing single risk factors i.e. hypertension, hypercholesterolemia, or the total cardiovascular risk approach.³ The latter approach is more cost effective in low-resource settings as it estimates the individual's probability of having fatal or non-fatal cardiovascular events (heart attack and stroke) in a given period, by taking into account the presence of several predicting risk factors rather than single risk factors.³⁻⁵

There are several tools developed to assess the individuals' total cardiovascular risk but they were mainly derived from the Framingham study based on western population, which might not be applicable to others.⁵ The World Health Organization (WHO) and International Society of Hypertension (ISH) have jointly developed the WHO/ISH risk prediction charts using data collected from the different regions of WHO sub-regions and thus, they are more appropriate in settings where refined risk prediction charts do not exist.^{5,6} The WHO/ISH risk charts were initially intended for clinicians to estimate the individuals' 10-year total cardiovascular risk in low-resource settings but they are also useful for estimating and monitoring the distribution of cardiovascular risk from cross-sectional study samples.^{3,7}

Similarly, Brunei Darussalam is also burdened with high CVD related mortality. Heart disease, cerebrovascular disease and hypertensive diseases are the top causes of deaths in 2015 and they accounted for 32.1% of total deaths in the country.⁸ The rise in the prevalence of non-communicable disease risk factors among the adult population in Brunei Darussalam is alarming.⁹ Among the work-

force in Brunei Darussalam, the civil servants were reported to suffer from high blood pressure (38%), obesity (28%), high fasting blood cholesterol level (25%) and high fasting blood glucose (11%).¹⁰ This has significant public health implications as the burden of CVD may affect the economically productive workforce in the future. Despite these concerns, information regarding CVD risk factors among the working adults in Brunei Darussalam is very limited and their 10-year total cardiovascular risk has not been previously studied. Therefore, this study aimed to estimate the prevalence of modifiable CVD risk factors with stratification of 10-year cardiovascular risk among the working adults in Brunei Darussalam.

METHODS

Study population and setting

The study design was cross sectional using data collected retrospectively at the Occupational Health Division (OHD), Ministry of Health Brunei Darussalam. The subjects were employees from both government and private organizations who had attended medical fitness assessment at OHD from 2010 to 2014. Study inclusion criteria were working adults aged 40–60 years. Those with recorded past medical history of cardiovascular diseases were excluded from the study.

Sample size and sampling technique

As a priori, based on a study power of 80%, the sample size required for the study was 1274 at 95% Confidence Interval (CI) and a precision of 0.025 using the sample size calculator for prevalence studies by Naing *et al.*¹¹ Including an anticipated 30% exclusion rate, the total sample size required for the study was 1819. As shown in Figure 1, 1819 subjects were randomly selected from within the sample frame of 2999 working adults registered at OHD. After excluding subjects with history of CVD ($n=21$) and missing data ($n=423$), a final sample of 1375 was used for

analysis, which was within the study required sample size of 1274. Based on the final sample (n=1375), the study achieved a statistical power of 84% with a precision of 0.05.¹²

Ethics consideration

Permission to conduct the study was given by the Medical Superintendent of Public Health and Head of OHD. Ethical approval for the study was obtained from the Medical and Health Research and Ethics Committee, Ministry of Health Brunei Darussalam and the Institute of Health Sciences Research and Ethics Committee (MHREC and IHSREC Ethics Approval Reference: UBD/HIS/B3/8). To maintain confidentiality of all subjects, no identifiable data such as name or national identification numbers were collected.

Data collection

Subjects’ medical history and medical fitness assessment were conducted by medical doctors and nurses at OHD and recorded in OHD patients’ database. For anthropometric assessment, a stadiometer (model ‘Meter O Health’) was used to measure weight and height in kilograms (kg) and centimeters (cm) respectively. Body mass index (BMI) was calculated according to the formula: weight in kg /height in meter². Blood pressure assessment was conducted manually using a sphyg-

momanometer with a stethoscope; the systolic blood pressure (SBP) and diastolic blood pressure (DBP) were measured in mmHg. Blood samples such as fasting blood glucose (FBG) and full lipid profile (total cholesterol, triglyceride, HDL and LDL-cholesterol levels) were taken according to the Ministry of Health (MOH) standard operating procedure. The blood results were subsequently analyzed and reported by the MOH scientific laboratory with ISO accreditation. All data were later extracted from OHD patients’ database and entered into the study electronic data entry form created using Microsoft Access version 2016 (Microsoft Office Access 2016, USA), which was tested for reliability and reproducibility by two investigators (SC and AO) who performed the data entry during pilot testing. The inter-rater agreement was Kappa 0.68 indicating fair to good agreement according to Fleiss.³

Variables collected for the study were: socio-demographic variables (age; gender; ethnicity; organizations), medical history (smoking status; history of hypertension and diabetes; the use of anti-hypertensive, diabetes/insulin and cholesterol lowering medications), physical measurement variables (height; weight; BMI; SBP and DBP) and biochemistry measurement variables (FBG level in mmol/l; total cholesterol level in mmol/l; triglyceride level in mmol/l; HDL-cholesterol level in mmol/l and LDL-cholesterol level in mmol/l).

WHO/ISH risk prediction chart

The current study utilized the WHO/ISH risk prediction chart for Western Pacific Region A (WPRA) to estimate the total 10-year CVD risk (defined as the risk of suffering fatal or non-fatal CVD events such as myocardial infarction or stroke in the next 10 years). It is the only prescribed algorithm for CVD risk assessment in Brunei Darussalam and other countries like Australia, Japan, New Zealand and Singapore.¹⁴ According to Brunei Darussalam Multi-sectoral action plan for the prevention and

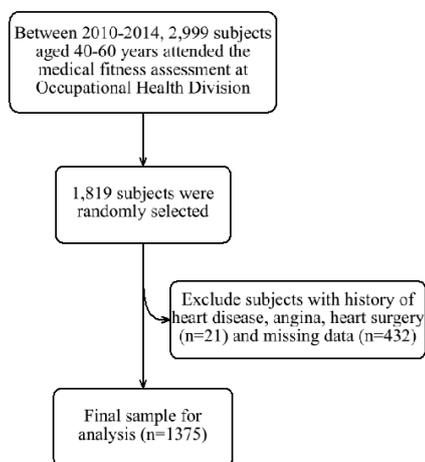


Figure 1. The sampling technique of the study.

control of non-communicable disease (BruMap-NCD) 2013–2018 (Annex 3, page 76), WHO/ISH risk chart was also advocated as a tool for assessing CVD risk of the individuals.⁹ In this study, the chart for settings with blood cholesterol was used and it is designed for people above 40 years, the subjects included were aged 40 years to 60 years (the official retirement age). The variables for CVD risk prediction were gender, age, systolic blood pressure (SBP), presence or absence of diabetes, total cholesterol level (mmol/l) and smoking status. The WHO/ISH risk chart categorizes individuals into different risk levels: <10%, 10%–<20%, 20%–<30%, 30%–<40% and >40%.¹⁴

Definitions of variables

For assessment of the prevalence of CVD risk factors, smoking was defined as the use of any smoke form of tobacco product (cigarettes, cigars or pipe tobacco) in the last one year.¹⁴ Hypertension was defined as systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg, or taking anti-hypertensive medications.¹⁵ Hypercholesterolemia was defined as total cholesterol level ≥ 6.2 mmol/l (240 mg/dl) or taking cholesterol-lowering medications.¹⁶ Diabetes was defined as FBG level ≥ 7 mmol or taking insulin or hypoglycemic medications.¹⁴ Subjects with BMI ≥ 30 kg/m² were classified as obesity.¹⁷ The 10-year total cardiovascular risks were stratified into low risk (WHO/ISH risk: <10%), moderate risk (WHO/ISH risk: 10–20%) and high risk (WHO/ISH risk: >20%).⁷

Statistical analysis

Continuous data were presented as mean (standard deviation (SD)) and categorical data as number and percentage. Data analysis was performed using IBM SPSS Statistics 21.0 software (SPSS Inc., IBM, USA). In simple logistic regression (SLR), odds ratio (OR) and 95% confidence interval (CI) were used and results were considered significant at p value of <0.05. Multiple logistic regression

(MLR) analysis was subsequently applied to determine CVD risk factors after adjusting for confounders (adjusted OR and 95% CI). The proportions of total cardiovascular risk among subjects were reported as number and percentage after the application of WHO/ISH risk charts.

RESULTS

The mean age of the study sample was 48.0 (5.55) years of which 76.1% were male and 23.9% were female (Table 1). The majority of the subjects were employees from the government sector (81.8%) and of Malay ethnicity (79.6%). The mean body mass index (BMI) was 27.6 (4.40) kg/m². The systolic and diastolic blood pressure mean was 126.8 (15.15) and 81.9 (9.37) respectively. Mean fasting total cholesterol (TC) and LDL-cholesterol were 5.3 (1.07) mmol/L and 3.37 (0.95) mmol/L respectively.

In Table 2, among the modifiable CVD risk factors studied, the prevalence of hypertension was 49% (95% CI: 46%, 52%) and followed by hypercholesterolemia 36% (95% CI: 33, 38), obesity 26% (95% CI: 24%, 29%), smoking 21% (95% CI: 18%, 23%) and diabetes mellitus 18% (95% CI: 16%, 20%). In comparison to female, males had a higher prevalence in smoking, hypertension and hypercholesterolemia (27% vs 4%; 49% vs 47%; 37% vs 31%) except for obesity and diabetes mellitus (24% vs 35%; 17% vs 19%) which is higher in females.

The associations between socio-demographic characteristics and smoking, hypercholesterolemia and obesity are shown in Table 3. The results of SLR showed significant associations in smoking and hypercholesterolemia according to age ($p < 0.001$ and $p < 0.001$ respectively), gender ($p < 0.001$ and $p = 0.045$ respectively) and ethnicity ($p < 0.001$ and $p = 0.017$ respectively). In obesity, the associations were only significant according to

Table 1: The general characteristics of the study sample (n=1375)

Variables	n (%)	Mean (SD)
Social Demographics		
Age (Yrs)		48.0 (5.55)
Gender		
Male	1046 (76.1)	
Female	329 (23.9)	
Ethnicity		
Malays	1094 (79.6)	
Indians	73 (5.3)	
Chinese	39 (2.8)	
Others	169 (12.3)	
Organisations		
Government	1125 (81.8)	
Private	250 (18.2)	
Medical History		
History of smoking	283 (21.0)	
Use of antihypertensive medications	395 (28.7)	
Use of Diabetic medications	178 (12.9)	
Use of Cholesterol medications	315 (22.9)	
Physical Measurements		
Height (cm)		161.5 (7.74)
Weight (Kg)		72.3 (12.71)
BMI (Kg/m ²)		27.6 (4.37)
SBP (mmHg)		126.8 (15.15)
DBP (mmHg)		81.9 (9.37)
Biochemistry Measurements		
FBG (mmol/L)		5.7 (2.19)
TC (mmol/L)		5.3 (1.07)
TG (mmol/L)		1.54 (1.02)
HDL-C (mmol/L)		1.32 (3.94)
LDL-C (mmol/L)		3.37 (0.95)

SD=Standard deviation, Yrs=Years, BMI=body mass index, SBP=Systolic blood pressure, DBP=Diastolic blood pressure, FBG=fasting blood glucose, TC=total cholesterol, TG=triglyceride, HDL-C=HDL-cholesterol, LDL-C=LDL-cholesterol.

gender and ethnicity ($p < 0.001$ and $p = 0.002$). MLR analysis showed three models were statistically significant: age with smoking and hypercholesterolemia ($p = 0.002$ and $p = 0.038$ respectively); gender with smoking, hypercholesterolemia and obesity ($p = 0.046$, $p < 0.001$ and $p = 0.013$ respectively); and Malay ethnicity with smoking, hypercholesterolemia and obesity ($p < 0.001$, $p = 0.005$ and $p < 0.001$ respectively). After adjusting for age and gender, males were 3.37 times more likely to smoke (adjusted OR 3.37, 95% CI 1.31, 8.70) and 1.62 times more likely to have hypercholesterolemia (adjusted OR 1.62, 95% CI 1.13, 2.31) where as females were 2.85 times more likely to have obesity compared to males (adjusted OR 2.85, 95% CI 1.81, 4.49).

Applying the WHO/ISH risk charts, 98% of the subjects were stratified into low-risk group (<10%), 1.5% were in moderate-risk group (10%-<20%) and 0.5% in high-risk group (>20%) respectively.

DISCUSSION

The findings showed that modifiable CVD risk factors were prevalent among the study population, more specifically smoking, hypercholesterolemia and obesity after adjusting for confounders.

It is well recognized that tobacco smoking increases the risk of CVD mortality and other chronic diseases such as chronic obstructive pulmonary disease and cancer.¹⁸ In our study, the overall prevalence of smok-

Table 2: Prevalence of cardiovascular risk factors of the study sample.

Variables	Male (n=1046)		Female (n=3290)		All (n=1375)	
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI
Smoking	279 (27)	24, 29	4 (1.0)	0.0, 2.0	283 (21)	18, 23
Obesity	249 (24)	21, 26	114 (35)	29, 40	363 (26)	24, 29
Hypertension	517 (49)	46, 52	155 (47)	42, 53	672 (49)	46, 52
Diabetes Mellitus	181 (17)	15, 20	62 (19)	15, 23	243 (18)	16, 20
Hypercholesterolemia	388 (37)	34, 40	102 (31)	26, 36	490 (36)	33, 38

Smoking was defined as the use of any smoke form of tobacco product (cigarettes, cigars or pipe tobacco) in the last one year; Obesity was defined as BMI ≥ 30 kg/m²; Hypertension was defined as use of antihypertensive medications or SBP ≥ 140 mmHg or DBP ≥ 90 mmHg; Diabetes mellitus was defined as use of diabetic medications or fasting blood glucose ≥ 7 mmols/l; Hypercholesterolemia was defined as use of lipid lowering medications or Total Cholesterol ≥ 6.2 mmol/l.

Table 3: The association between socio-demographic characteristics, smoking, hypercholesterolemia & obesity in Crude OR & Adjusted OR.

SMOKING		SLR			MLR		
Variables		Crude OR (95% CI)	p Value	SE	Adj OR (95% CI)	p Value	SE
Age (yrs)	40-50	2.44 (1.78, 3.35)	<0.001	0.161	0.19 (0.04, 0.97)	0.046	0.847
	51-60	1.00			1.00		
Gender	Male	16.25 (7.59, 34.79)	<0.001	0.388	3.37 (1.31, 8.70)	0.012	0.484
	Female	1.00			1.00		
Ethnicity	Malays	4.32 (2.66, 7.02)	<0.001	0.248	3.72 (2.26, 6.13)	<0.001	0.254
	Others	1.00			1.00		

HYPERCHOLESTEROLEMIA		SLR			MLR		
Variables		Crude OR (95% CI)	p Value	SE	Adj OR (95% CI)	p Value	SE
Age (yrs)	40-50	1.00	<0.001	0.117	1.00	<0.001	0.245
	51-60	1.68 (1.34, 2.11)			2.76 (1.70, 4.50)		
Gender	Male	1.31 (1.01, 1.71)	0.045	0.135	1.62 (1.13, 2.31)	0.008	0.18
	Female	1.00			1.00		
Ethnicity	Malays	1.41 (1.06, 1.88)	0.017	0.145	1.52 (1.13, 2.03)	0.005	0.149
	Others	1.00			1.00		

OBESITY		SLR			MLR		
Variables		Crude OR (95% CI)	p Value	SE	Adj OR (95% CI)	p Value	SE
Age (yrs)	40-50	1.04 (0.81, 1.34)	0.778	0.129	1.21 (0.89, 1.65)	0.216	0.157
	51-60	1.00			1.00		
Gender	Male	1.00	<0.001	0.137	1.00	<0.001	0.232
	Female	1.70 (1.30, 2.22)			2.85 (1.81, 4.49)		
Ethnicity	Malays	1.66 (1.20, 2.26)	0.002	0.166	1.82 (1.30, 2.54)	<0.001	0.170
	Others	1.00			1.00		

SLR=Simple logistic regression, MLR=Multiple logistic regression, Crude OR=Crude odds ratio, Adj OR=Adjusted odds ratio, SE=Standard errors, Yrs=Years

ing was 21%. According to the 2nd National Health and Nutrition Status Survey (NHANSS) 2009-2011, the prevalence of smoking among

Table 4: The proportion of total cardiovascular risk among the subject sample (n=1375)

Risk Levels	n	%
Low risk (<10%)	1348	98
Moderate risk (10-<20%)	20	1.5
High risk (>20%)*	7	0.5
Total	1375	100

*High risk includes WHO/ISH risks: 20% to <30%, 30% to <40% and ≥40%.

the Bruneian adults (aged >19 years) was 17%.⁹ However, in a similar study by Ot-gontuya et al., the prevalence of smoking in Malaysia was 23.6% and 31.7% in both Cambodia and Mongolia, which was higher compared to our study.⁷ In addition, our study has shown smoking to be higher among males compared to females (27% vs 1%) and this was also reflected in the general adult population (32.8% in male smokers vs 3.7% in female smokers) in Brunei Darussalam.⁹ This finding was further supported by another study which suggested males were significant-

ly more likely to smoke than females in Asian culture.¹⁹ The lower prevalence of smoking in this study may be due to the implementation of Tobacco Order 2005 and Tobacco regulations in Brunei Darussalam, which prohibits smoking in all workplaces and public areas.

In this study, hypercholesterolemia has shown to affect more than one third of the subjects (36%) and it was reported as 11.6% among the adult population in Brunei Darussalam.⁹ This finding was higher in comparison to a similar study conducted in Cambodia, Malaysia and Mongolia where it was 14.1%, 3.3% and 23.6% respectively.⁷ In our study, hypercholesterolemia was significantly higher in males compared to females which was supported by other studies.^{20, 21} Hypercholesterolemia is a major risk factor of CVD and it is related to other lifestyle factors such as smoking, physical inactivity, unhealthy diet and obesity.⁶ This stresses the importance of lipids screening for all workers in the detection and the management of hypercholesterolemia. In addition to pharmacological treatment, lifestyle intervention programs such as smoking cessation, healthy diet and physical activity have also shown to be effective in reducing total cholesterol level.⁶

In the current study, the overall prevalence of obesity was 26%. According to the 2nd NHANSS 2009-2011, obesity was 27% among the adult population in Brunei Darussalam.⁹ However, in Malaysia, obesity was 11.2% among the population aged between 30-65 years, which was lower compared to our study.²² Our study also reported higher prevalence of obesity in female compared to male, which is in line with the report in the 2nd NHANSS 2009-2011.⁹ A study by Linhart *et al.*, also reported that women had a higher BMI compared to men.²³ Additionally, in our study, obesity was significantly higher in females aged 51-60 years and this could be explained by weight gain following menopause, lower metabolic rate and the decrease

in the level of physical activity with age.²⁴ Weight gain has been associated with chronic diseases such as diabetes, cardiovascular disease and cancers, which imposes an enormous health, social and economic burden.²⁵ Therefore, these findings suggest there is scope for targeted interventions to prevent obesity in this demographic.

Finally, utilizing WHO/ISH risk prediction charts, 0.5% of the subjects in our study were at high risk of developing cardiovascular events in ten years. This proportion of high-risk group is lower in our study compared to that of the study conducted in Cambodia (1.3%), Malaysia (2.3%) and Mongolian (6%).⁷ Another study had similar heterogeneous results in different countries (China 1.1%, Iran 1.7%, Sri Lanka 2.2%, Cuba 2.8%, Nigeria 5.0%, Georgia 9.6%, Pakistan 10.0%)³. The lower proportion of 10-year total cardiovascular risk in our study may be partly due to the treatment effect.²⁶ As explained by Liew *et al.*, treatment effect occurred because cardiovascular risk scores did not account for the individuals whose risk was lowered as a result of treatment for hypertension, and in our study, 28% the subjects were on treatment with anti-hypertensive medications.²⁶ The WHO/ISH risk prediction charts have also published with guidance that recognized cardiovascular risk might be lower in subjects already on hypertensive therapy.¹⁴

Study Limitation

To our knowledge, this is the first study that attempted to stratify the 10-year total cardiovascular risk among the adults working in Brunei Darussalam and the prevalence of some of the modifiable CVD risk factors. Nevertheless, there are some limitations. This study was conducted at OHD where only employees who required medical fitness assessment were registered and therefore, it may not be representative of the whole working population in Brunei Darussalam. Another limitation is the WHO/ISH risk chart for WPRA

has not been validated in Brunei Darussalam due to the absence of prospective cohort studies. This risk prediction chart might have underestimated the total cardiovascular risk due to anti-hypertensive therapy, which is noted in the WHO/ISH risk charts guidelines. However, the WHO/ISH risk prediction charts have been identified as a key tool in the successful implementation of action plan for the prevention of non-communicable diseases in developing countries where CVD prediction models were non-existent.²

CONCLUSION

Although the majority of the subjects in our study were stratified as low risk of developing cardiovascular events in ten years, low risk does not equate to 'no risk'. The high prevalence of modifiable CVD risk factors such as hypercholesterolemia and obesity in our study suggests increased future burden of CVD. The findings of this study may be useful for public health practitioners, policy makers or researchers for the planning of health promotion programme with health screening at workplaces and also as baseline data to measure temporal changes.

Acknowledgements

We would like to thank all the staff from the OHD, Ministry of Health Brunei Darussalam for their assistance in the study. We are also grateful for the assistance of Asmah Omar from the Master in Public Health programme for her involvement in the pilot study.

Declaration of Conflicting Interests

The authors declared no conflict of interest with respect to the authorship and/or publication of this article.

Funding

The authors did not receive any funding or financial support of any form for the research.

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Single Incision laparoscopic Cholecystectomy (SILC) Using A Novel Glove Port Technique: Early Unit Experience.

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ABSTRACT

Background: Single Incision Laparoscopic Cholecystectomy (SILC) was first introduced about 2 decades ago, as an evolution of the gold standard 3-4 ports laparoscopic cholecystectomy. **Objectives:** The objective of the study was to assess the safety and feasibility of SILC using a novel Glove Port Technique. **Methodology:** This is an retrospective cohort study of SILC using a novel glove port technique, carried out at our centre from 1st September 2014 to 31st December 2016. Data on patients' demographic data, operative time, post-operative pain, length of stay, post-operative intervention were retrieved from patients' medical records and overall satisfaction were recorded at follow-up. **Results :** A total of 50 patients, mean age of 58.2 ± 16.5 years, underwent SILC at our centre during the study period and were included in the study. The mean operating time was 83.6 ± 39 minutes. Thirty-five patients (70%) underwent SILC without additional ports or conversion. All patients who underwent SILC had minimal blood loss of less than 50mls (only 2 patients who were converted to open cholecystectomy had blood loss of 200mls and 250mls). The mean score for postoperative pain were 3.4 ± 1.8. The length of stay was 2.8 ± 3.0 days. Only 6 cases developed post-operative complications, which resolved with treatment within 30 days. There was no mortality recorded. The mean satisfaction score at 1 month was 8.9. **Conclusion:** Although technically more challenging, SILC is a safe and feasible procedure, with good and satisfactory post-operative outcomes. However these satisfactory outcomes are only achieved currently by surgeons who are trained in advanced laparoscopic surgery.

Keywords: Cholecystectomy, Gallbladder, Incision, Laparoscopy, Port

INTRODUCTION

Laparoscopic cholecystectomy is the gold standard in treating gallstones diseases. Evolution in surgical field had brought this procedure from conventional laparoscopic cholecystectomy (CLC) to single incision laparo-

scopic cholecystectomy (SILC). The first reported SILC case was by Navarra et al in 1997 using two periumbilical incisions that were later joined to remove the gallbladder.¹ Since then, specially designed curve laparoscopic instruments and single port devices such as SILS port (Single Incision Laparoscopic Surgery, Covidien), ASC Triport (Advanced Surgical Concept) and the Gel-

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POINT device (Applied Medical Resources Corp), have been introduced to facilitate surgeons in performing this operation.²

Our centre starting performing SILC surgery in 2014. However due to the high cost of the above single port devices, our centre has adapted using SurgiSleeve (Covidien, USA) and sterile surgical gloves, as handmade port, a technique adapted from Son and coworkers who used ALEXIS wound protector (Applied Medical) as their port.^{1,3}

SILC has been reported to give better patient satisfaction as well as cosmesis and lesser pain.^{4,5} Even though this procedure took longer than CLC, the operation time was significantly reduced as the surgeons gained experience and confidence.^{5,6}

The objective of the study was to assess our unit's early experience in performing SILC by looking at intraoperative and postoperative outcomes and patients' satisfaction at 30 days post-surgery.

METHODS

Patients

We performed a retrospective cohort study of our centre performance of SILC surgery carried out from 1st September 2014 to 31st December 2016. Patients who had undergone SILC during this period were identified from our operation theatre records. Data on socio-demographics such as age, gender, body mass index, indication for surgery, operative time, conversion rate, intra-operative blood loss and post-operative outcomes such as pain score, re-intervention, length of hospital stay, post-operative complications and patients overall satisfaction score were retrieved from patients medical records. The latter two outcomes were assessed at 1 month follow up.

Operative Technique

Patients were positioned in supine position with their right arm abducted and in French position. General anesthesia was used for all patients. The surgeon stands between patient's legs, the assistant to his left and scrub nurse to his right. A high definition monitor and the insufflator system (Karl-Storz HD, Karl-Storz, Germany) were positioned to the right of the patient's right shoulder. An umbilical incision of 25-30mm through the umbilicus was made. Rectus fasciotomy was performed to enter the peritoneal cavity. SurgiSleeve® (Covidien, USA) was used to protect and retract the wound. Size 8 sterile, non-powdered glove was used as a novel multi-port access for instrumentation. (Figure 1)

Three size 5mm endoscopic caps and a 5mm flexible ports (Karl-Storz Endoscope, Karl-Storz, Germany) were used as working channels. CO₂ gas insufflation was maintained at a pressure between 10-12 mmHg. Fifty centimetre 5mm Hopkins II® 30° telescope and 5mm curved laparoscopic instruments



Figure 1: Hand made Glove Port using size 8 sterile glove



Figure 2: Special curved instruments and ultrasonic device used for SILC.

(Karl-Storz Endoscope, Karl-Storz, Germany) were used. Sonicision™ (48cm, Covidien, USA) was used for dissection. (Figure 2) The gallbladder was dissected in the standard manner, followed by dissection of the Calot's triangle to expose the cystic duct and artery which was then ligated using Ligamax5® (Ethicon, USA). The gallbladder was removed through the umbilical port. Umbilical port wound was closed with Vicryl 3/0 suture (Figure 3).

Post-operative management

All patients were prescribed tablet enterocoxib 90mg daily from post-operative Day 1 to maximum Day 7 as standard analgesia. If the patient had contraindication for non steroidal anti-inflammatory drugs, simple opioids capsule Tramadol 50 mg three times daily were prescribed as replacement.

Statistical analysis

Categorical data was presented in number and percentage. Numerical data (age, operative time and length of stay) were presented



Figure 3: Post operative surgical scar.

as mean (SD). Scoring of pain score was based on a visual analogue scale from 1 to 10, where 1 represents no pain and 10 represents very intense pain. For patient's satisfaction score, a similar visual analogue scale from 1 to 10 was used, with 1 representing poor satisfaction and 10 representing high satisfaction. Patient's satisfaction score were obtained at 30-day clinic follow-up.

RESULTS

A total of 50 patients underwent SILC at our centre between 1 September 2014 to 31 December 2016. The mean age was 58.2 ± 16.5 years (range: 15 - 80 years old) The mean body mass index (BMI) recorded was 24.3 ± 2.2 (range: 19.0 - 32.1). Eleven (22%) were male and 39 (78%) were female (Table 1).

The mean operating time was 83.6 ± 39 minutes (Range 40 to 175 minutes). Mean operative time for the first 5 cases was 111 minutes but this was reduced to 69.2 minutes with the last 5 cases, as the experience increases.

Successful completion of the SILC was

Table 1: Patient's demographics and operating data.

	Mean (SD)	n= 50 (%)
Age (years)	58.2 (16.6)	
Gender		
Male		11 (22%)
Female		39 (78%)
BMI (Kg/m²)	23.9 (2.7)	
Indications		
Biliary colic		15 (30%)
Cholecystitis		32 (64%)
Gallstone pancreatitis		3 (6%)

achieved in 35 patients (70%). Thirteen patients require additional port at the epigastrium to assist the dissection of the Calot's triangle. Two cases, both with Cusheiri scale grade 4, required conversion to open cholecystectomy for completion.

All patients who underwent SILC had minimal blood loss of less than 50mls (only two patients who were converted to open cholecystectomy had blood loss of 200mls and 250mls respectively). Four cases of bile or stone spillage were reported but no intraoperative major events such as bleeding, bile duct injury or bowel injury were encountered. (Table 2)

The mean score for post-operative pain were 3.4 (1.8) (range: 0 - 7) and no patients reported pain score of 10 that interrupt their daily or work activities. Only 6 cases of early post-operative complications were recorded which resolved with treatment within 30 days (Table 3). The reported complications were surgical site infection, which resolved with daily dressing and antibiotics, intra-abdominal collection requiring re-laparoscopy and drainage, bile leak from cystic stump resolved with ERCP and bile duct stenting and subcapsular liver haematoma which resolved spontaneously. No mortality was recorded. Hospital length of stay was 2.8 (3.0) days.

Table 2: Patient's demographics and operating data.

	Mean (SD)	n= 50 (%)
Cusheiri Scale		
G1		34 (68%)
G2		14 (28%)
G3		0
G4		2 (4%)
Conversion		
No Conversion (SILC)		35 (70%)
Additional 1 port		9 (18%)
Additional 2 ports		4 (8%)
Open		2 (4%)
Laparotomy		0
Operation time (minutes)	83.6 (39)	
Blood loss		
< 50 mls		48 (96%)
50-100 mls		0
> 100 mls		2 (4%)
Intraoperative Complications		
No complication		56 (92%)
Bile/stone spillage		4 (8%)
Bleeding		0
Bowel injury		0
Bile duct injury		0

Table 3: Post-operative and 30-days-outcome.

	Mean (SD)	n= 50 (%)
Pain score	3.4 (1.8)	
Pain duration (days)	2.9 (2.1)	
Length of Stay (days)	2.8 (3.0)	
Post-operative complications		
Surgical site infection		2 (4%)
Intra-abdominal Collection		1 (2%)
Bile leak		1 (2%)
Subcapsular liver haematoma		1 (2%)
Incisional hernia		1 (2%)
Intervention required		
Re imaging		3 (6%)
Antibiotic (post-operative for 1 week)		4 (8%)
ERCP and biliary stenting		1 (2%)
Relaparoscopy and lavage		1(2%)
Incisional hernia repair (primary closure)		1 (2%)
Overall satisfaction at Day30	8.9 (1.1)	

Mean patients satisfactory score at follow up at 4 was 8.9 (1.1) (Table 3: range 7 - 10). One patient had incisional hernia at 1-month follow up due to the suture cutting through the rectus sheath from excessive cough. The patient had immediate hernia repair and primary closure without further long term complication.

DISCUSSIONS

CLC has been the gold standard for managing gallstones diseases since the 1980s, completely replacing open cholecystectomy. However, CLC requires at least 3 to 4 ports for instrumentation and dissection. Thus the next stage of evolution of CLC is the reduction of the number of ports required and Navarra *et al* in 1997 first reported SILC using two periumbilical incisions that were later joined as a single incision to remove the gallbladder.¹ Since then, interest in SILC surgery has increased tremendously and its evolution has been driven by industry with the development of single port devices, curve articulating instruments and specialized laparoscopic cameras. Innovative surgeons contribute further to the refinement of SILC technique. Surgeons like Mohamed Masry from Egypt used multiple hooks to elevate the gallbladder to facilitate dissection via Marionette technique.⁷ Young Rok Choi and coworkers from Korea developed SILC without camera operator where the surgeons control the camera using flexible 90 degrees scope.⁸ A meta analysis comparing SILC and CLC of 25 randomized controlled trials conducted in 2013 reported that SILC is superior to CLC in term of better cosmetic results and less post-operative pain but however inferior in term of operative time.⁹

SILC is commonly conducted in an inverse triangulation technique with the operator hands working in opposite direction; the right hand is used to control laparoscopic for-

ceps to hold the gallbladder while the left hand controls instrument used for dissection.² Our technique differs in that we used a non-inverse triangulation technique with the multi-access port created using a sterile glove. Our novel technique of using a sterile glove for multi-access ports has the additional benefit of reducing cost by cutting down on the use of costly single port access devices.

Using our technique, we successfully completed 70% of SILC without any conversion or additional ports. Only 13 patients require additional ports at the epigastrium to facilitate the dissection of the Calot's triangle. In our series, only 2 patients underwent conversion to open cholecystectomy but this was in the early part of our centre learning curve. However, no patient requires conversion to laparotomy. Our centre's conversion rate using this novel technique was only 4% which is acceptably low. Among the reason for additional ports and conversion were hostile Calot's triangle by evidence of higher Cuschieri score, and anatomically redundant segment 4 of the liver obstructing the telescopic view. The two cases of conversion to open cholecystectomy had grade 4 Cuschieri scale.

Unlike CLC where there are abundant of well-established technical skills training workshops or programmes, there are currently none that are specific for SILC. To establish a SILC unit, surgeons need to purchase a whole new set of curve instruments. Abdelrahman *et al* in his study to evaluate stress and workload for those performing SILC mentioned that SILC was associated with significantly more awkward manipulations and more technical difficulty in performing the fine and precise movements when compared to CLC.¹⁰ Other factors such as instruments collisions, narrow and confine external surgical work space for both surgeon hands and instruments and the limited range of motion add to the complexity of the procedure.¹⁰ Currently SILC is almost exclusively performed by highly

skilled laparoscopic surgeons. A review of SILC operative experience recommends 10 to 19 cases to be conducted by a trained laparoscopic fellowship in order to be certified competent in performing SILC.^{11,12}

STUDY LIMITATION

Our study has several limitations, the first and foremost is that this is a retrospective cohort study which can be affected by missing data or patient's medical records. Secondly is the small sample size of 50 cases but this study is reporting on our centre's early experience in conducting SILC surgery. Furthermore, learning curve may affect some of the outcome measures particularly operative time, blood lost and post-operative complications. However despite these limitations, we were able to show that SILC can be performed safely and with good outcome results.

CONCLUSIONS

SILC is technically more challenging compared to CLC. It is a safe and feasible procedure and has high patient's satisfaction, better cosmesis and low post-operative pain score. Reasonable success rate and reduction of operation time can be reached after an average of one year or ten cases performed. We recommend that SILC must be performed by expert surgeons who have previous training in advanced laparoscopy.

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Wan Aliaa WAN SULAIMAN, HOO Fan Kee



Figure 1

A 65-year-old lady with a history of stroke was seen in the follow up neurology clinic with a complaint of discoloured urine (Figure 1). She was recently being discharged from the ward with a urinary catheter but her urinary catheter has not been changed for the past 3 weeks. On inspection of her urine bag and tubing, purplish discoloration of urine was noted. She did not have any symptoms such as fever or lower urinary tract symptoms.

What is the diagnosis?

Answer: refer to page 182

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Figure 1

A 66-year-old gentleman, with no past medical illness complained of itchiness over the shin. It was associated with skin rash for past 2 weeks. Initially it was a small-sized, macular lesion however extending and migrating in thread like pattern. His hobby is gardening.

What is the diagnosis?

Answer: refer to page 183

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SURGICAL FIXATION OF TRAUMATIC LISFRANC FRACTURE-DISLOCATION: A CASE REPORT.

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ABSTRACT

Injuries of the Lisfranc joint are among the more prevalently missed diagnosis of midfoot injuries. This is more so when there is only subtle disruption of the joint. However, open Lisfranc fracture dislocation which is associated with high velocity injuries requires surgical intervention to restore the congruency of the tarsometatarsal joint. We present a case of a young gentleman who sustained an open fracture-dislocation of the Lisfranc joint which was treated surgically with fixation of the joint for better long-term outcome.

Keyword: *Lisfranc fracture, open reduction internal fixation, open fracture dislocation, arthrodesis*

INTRODUCTION

The term Lisfranc joint was coined by the French Napoleonic era field surgeon, Jacques Lisfranc, who described the method of amputations through this joint.¹ Circulatory compromises as well as compartment syndrome are the most devastating immediate complications for this injury. Midfoot injuries are of those involving the tarsometatarsal joint complex (TMC) and are prevalently a result of high energy injuries such as industrial, motor-vehicle and motorcycle accidents.¹ Conversely, these injuries may also happen as a result of minor twisting injuries as seen in athletes and the elderly.²

Myerson et al in 1986 emphasised

severe morbidity associated with Lisfranc injuries which include chronic subluxation following premature removal of K-wires which later on will lead to post traumatic arthrosis.¹ The aim in management of Lisfranc injury is to ensure anatomical reduction through rigid internal fixation devices. Even subtle diastasis or subluxation can lead to poor outcome if missed and left untreated.³ We reported the short term outcome of a case of open fracture-dislocation of the Lisfranc joint in a young gentleman, which was treated surgically.

CASE REPORT

A 14-year-old boy presented to a district hospital following a motor bike accident. He presented with right foot pain, bleeding and right foot deformity. Upon examination of the right foot, there was a deep laceration wound measuring 6 x 1cm which was horizontally overlying the dorsal aspect of the 3rd to 5th metatarsal bones. The distal pulses were

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were palpable and capillary refill time was less than 2 seconds and all the toes were pink. No neurological deficit was noted. There was limitation of the right foot range of motion (ROM). Radiographs of his right foot showed a complex, divergent type Lisfranc injury (based on the Quenu and Kuss classification, 1909), with an associated TMC injury (Figure 1a and 1b). No other injuries were noted and he was subsequently referred from the district hospital to our centre.

Upon discussion, a decision was taken to treat his right foot injury in a 2-stage procedure, due the severity of soft tissue injury and the delay in transfer of the patient from the district hospital to our centre which exceed 12 hours. The first stage of the procedure was performed at the district hospital, after discussion with our centre, which consisted of wound debridement with temporary stabilization of the fracture with external fixator and K-wires. Once this was done, the patient was transferred to our centre for the 2nd stage procedure. Intravenous cefuroxime at 1.5g three times a day was administered for 5 days and daily dressing of the wound and pin sites were done. A swab culture and



Figure 1a and 1b: Radiographs of the right foot showing Lisfranc fracture-dislocation of the 3rd to 5th metatarsal bones, taken with backslab on. (Click to enlarge)



Figure 2a and 2b: Radiographs of the right foot post open reduction and internal fixation using screws and locking plates, showing good anatomical reduction. (Click to enlarge)

sensitivity (C&S) was taken which showed no growth. Infective parameters were also normal. After post trauma day 12, patient underwent the second stage of the procedure with open reduction and internal fixation of the fractures.

As the original wound was overlying the 3rd until 5th metatarsal bones, careful vertical incisions were made over the 1st and 4th metatarsal bone in order maintain adequate skin bridge between the 2 incisions. The medial cuneiform was reduced first, followed by the 1st TMT joint and then the 2nd and 3rd TMT joints. This was achieved using 4.0mm cannulated headless screws which were counter-sunk. Next, the 4th and 5th MTBs were fixed with locking plates on the dorsal side. Finally, a last mini screw was inserted at the fracture of the 4th MTB head. The alignment and stability of all the TMT joints was confirmed under image intensifier and the skin was opposed with non-absorbable sutures (Fig 2a and 2b).

Post operatively, the ankle was put on below knee plaster splint in neutral position for 2 weeks until suture removal. Patient was discharged well after 5 days. ROM of ankle and foot was started after removal of the splint. However, patient was advised for non-weight bearing for at least 6 weeks before being allowed to partially weight bear on the



Figure 3: (a) The right foot at 3 months follow-up showing healing of the wounds. (shown by arrow head) , (b) Radiograph of the right foot at 6 months post removal of screws over the Lisfranc joint.

affected limb. At three months Follow-up, the fracture site has already united and patient was able to ambulate without walking aid. At six months post trauma, the patient underwent implant removal over the Lisfranc joint to allow full weight bearing of the joint and to increase ROM. Recently, at 1 year follow-up, he was able to resume his normal activities with ROM and no residual pain.

DISCUSSION

Open Lisfranc injury is not commonly seen in general orthopaedics practice and the outcome is unpredictable. In subtle Lisfranc injuries, the most significant findings on radiographs will be widening between the bases of the 1st and 2nd MTB bases. A flake at the base of the 2nd MTB, also called the 'fleck sign' can also point towards the presence of such a subtle injury.¹ Stress radiographs can also be used in making the diagnosis in the case of subtle injuries, but it needs to be done under anesthesia.

Whether it is a subtle or major dislocation, the Lisfranc joint has to be anatomically reduced so that the best functional outcome can be achieved and reduce long-term

morbidities such as residual pain, reduced ROM over the Lisfranc joint and early onset navicular-cuneiform arthritis.¹ Although plaster treatment may help to get modest alignment of the joint in cases of subtle subluxations, the long-term outcome is not promising.¹

In this particular case where there was an open fracture dislocation of the TMC with severe disruption of overlying soft tissues, immediate attention should be given to the soft tissue condition. External fixator and K-wires were used in this case to temporarily stabilize the fracture whilst waiting for soft tissue condition to improve. Fasciotomies are generally performed if compartment pressures are noted to be high particularly in such cases with severe soft tissue disruption and vascular compromise.⁴ However in our case, vascular supply was noted to be intact early on.

There are continuous debates as to whether open reduction and internal fixation (ORIF) or primary arthrodesis (PA) should be done for this type of injuries. Patients with mainly bony injury are usually considered for ORIF. Bony healing is more predictable than ligamentous healing and by retaining the small fragments of the fracture, primary bone healing can occur, adding to the stability of the fixation.¹ The use of dorsal plates is preferred over transarticular screws, as transarticular screws can cause iatrogenic damage of the TMT joint cartilage and this may lead to the post traumatic arthrosis which needs to be treated with an arthrodesis as a second surgery (about 40%).⁵ By using dorsal plates, this complication can be reduced and hence avoiding the need for secondary surgery for arthrodesis. In a study by Myerson *et al*, it was noted that applying an intermittent compression foot pump following screw fixation, can reduce limb swelling faster leading to earlier rehabilitation.⁶ With regards to implants removal after ORIF for Lisfranc injuries, it is advised to do so after 4 months, as Lisfranc injuries are

commonly associated with ligamentous injuries which may take up to 4 to 5 months to heal.¹

For patients planned for PA, they generally involve injuries which are mainly ligamentous. In view of the unpredictable and lengthy duration of ligamentous healing, PA is chosen over this group to ensure successful reduction of the TMC so as to prevent later diastasis which may occur if ORIF was done. Several studies have noted that when PA was performed for the pure ligamentous injury group, their post-operative function was much better than the ORIF group.^{7,8} This can be attributed not only due to the ligamentous injury but also due to the associated severe cartilage injury of the TMT joint which favours PA over ORIF. The post-operative outcome between PA and ORIF has been reported to be 92% and 65% respectively. However, for this case, it is not appropriate to perform PA as the patient is only 14 years old and is still in a growing age. He will need a secondary stage procedure later for arthrodesis if he develops the complications of post traumatic arthrosis.

Another cause of post traumatic arthrosis following surgery is related to the adequacy of the reduction. Komenda et al commented in their study that patients who underwent arthrodesis following the primary fixation were mostly due to the inadequate reduction because the extent of the initial injury was not well appreciated during the time of initial surgery.⁹ This further emphasizes the importance of achieving anatomic reduction especially in the groups who undergo ORIF as the primary surgery.

A study by Nithyananth et al on the long-term outcome of high-energy traumatic open lisfranc injuries in 13 patients, 5 out of 13 patients developed foot planus, 2 patients had spontaneous fusion of ankle joints, another 2 patients developed foot deformity due to contracture.¹⁰ This study also emphasizes on

good soft tissue management for better prognosis.

CONCLUSION

In conclusion, soft tissue management is of utmost importance when faced with Lisfranc injuries. To perform a single or 2-stage procedure depends on the extent of soft tissue injury. Anatomical reduction is imperative to achieve the best possible outcome and prevent post traumatic arthrosis. Despite our patient having Lisfranc injuries associated severe soft tissue injuries, we decided to perform a 2-stage procedure to get good soft tissue coverage with the first stage procedure, followed by second stage of primary fixation rather than arthrodesis with the aim of achieving good long-term functional outcomes in view of the patient's young age.

Acknowledgments

The authors would like to thanks Dr Ayesyah Abdullah for her technical help in preparing this case report.

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Gas forming Necrotizing Retropharyngeal and Parapharyngeal Abscess with Mediastinal Extension Causing Supraventricular Tachycardia.

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ABSTRACT

Combination of gas forming necrotizing retropharyngeal and parapharyngeal abscesses with mediastinal extension are rare, especially if the condition is complicated by development of chest pain and supraventricular tachycardia due to mediastinitis. We reported a case of a diabetic elderly man with previously known hypertension who was initially treated in a peripheral hospital with neck cellulitis which was complicated by chest pain, dyspnea and supraventricular tachycardia. He recovered fully after a series of neck surgeries and prolonged course of intravenous meropenem which was later changed to amikacin based on sensitivity over a period of 2 months.

Keywords: Necrotizing Retropharyngeal abscess, mediastinum, mediastinitis, Supraventricular tachycardia.

INTRODUCTION

Combination of necrotizing retropharyngeal and parapharyngeal abscess with mediastinal extension are rare, especially if the condition is complicated by development of chest pain and supraventricular tachycardia (SVT) due to mediastinitis. Such necrotizing infection with gas forming bacteria can spread very rapidly through tissue planes from the retropharyngeal and parapharyngeal space into the anterior mediastinum and carries high morbidity and mortality risk if not recognized and treated early.¹ We reported a case of a diabetic elderly man with previously known hypertension who was initially treated in a community hospital with neck cellulitis, which

was complicated by chest pain, dyspnea and SVT. He recovered fully after a series of neck surgeries and prolonged course of intravenous (iv) meropenem followed by iv amikacin based on sensitivity over a period of 2 months.

This case report highlights the significant cardiac morbidity and mortality associated with extensive necrotizing retropharyngeal and parapharyngeal abscess with mediastinal extension and the development of mediastinitis, which if detected early can be successfully managed with prompt surgical drainage and appropriate antibiotic therapy.

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CASE REPORT

A 66-year-old Malay man presented with symptoms of dysphagia, odynophagia and



Figure 1: Diffused anterior left-sided fluctuant neck swelling of the patient (White arrows).

hoarseness for 6 days. He had progressive poor oral intake with lethargy. His diabetes mellitus and hypertension were uncontrolled due to non-compliance with his medications. Clinical examination confirmed an anterior left-sided diffused fluctuant neck swelling (Figure 1). He was initially treated for sepsis secondary to neck cellulitis with iv ampicillin-sulbactam. On the day 4 of admission, he developed tachycardia, dyspnea and chest discomfort with electrocardiogram (ECG) showing SVT. The arrhythmia did not resolve with adenosine and amiodarone. He was then referred to Hospital Sultan Haji Ahmad Shah, a tertiary hospital, for Computed Tomography Pulmonary Angiogram (CTPA) with the suspicion of pulmonary embolism. CTPA revealed an extensive gas forming necrotizing parapharyngeal and retropharyngeal collection

with air pockets extending from retropharyngeal region to anterior mediastinum up to T7 level, measuring approximately 23.4 cm in length, surrounding the trachea, great vessels and right side of pericardium. There was no radiological evidence of pulmonary embolism (Figure 2 a & b). He was then referred to the Otorhinolaryngologist for further management.

Flexible nasopharyngolaryngoscopy revealed bulging posterior and left lateral pharyngeal wall partially obscuring the airway. He was admitted to Intensive Care Unit (ICU) for close observation in view of potential airway obstruction and escalated to iv meropenem. The SVT resolved with cardioversion upon arrival in ICU.

Emergency incision and drainage under local anesthesia was performed on the left side of his neck soon after ICU admission to release the trapped gas which relieved pressure on his airway transiently but he developed respiratory distress the next day requiring intubation. On ICU admission day 2, he underwent neck exploration bilaterally with incision and drainage of retropharyngeal and parapharyngeal abscess. Anesthesiologist anticipated prolonged ventilation for this patient due to the extensiveness of the disease and an elective tracheostomy was done in the same setting. A total of 100 ml pus was drained from bilateral parapharyngeal and

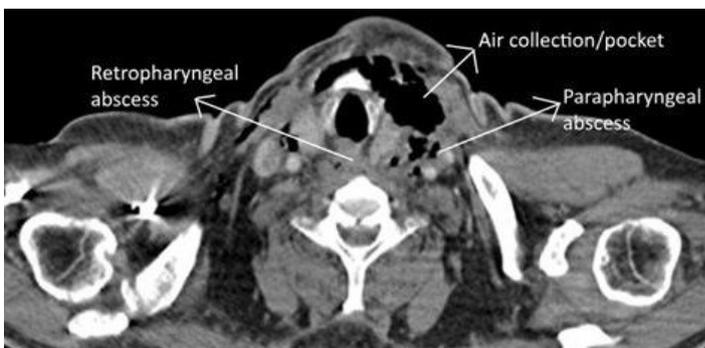


Figure 2a: Annotated CT axial view of neck revealed presence of RPA, PPA and air pockets surrounding upper airway.



Figure 2b: Annotated CT axial view of thorax revealed extensive superior and anterior mediastinal abscess.

retropharyngeal spaces.

Since the retropharyngeal space was communicating with the anterior mediastinum and also the pleural space was not involved, the cardiothoracic team, after consultation, advised against thoracotomy/thoracostomy or median sternotomy. Daily pus drainage of the neck wounds was performed with povidone dressing. The pus samples grew a mixed culture of ESBL-producing *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Burkholderia cepacia*, which were sensitive to meropenem.

He underwent wound debridement under general anesthesia after approximately 2 weeks of meropenem due to persistent pus discharge, which drained another 20 ml of pus intraoperatively. The sample cultured multi-drug-resistant *Acinobacter baumannii* and *Pseudomonas*, sensitive to amikacin and cefoperazone-sulbactam but resistant to meropenem. He subsequently responded very well to 2 weeks of iv amikacin and sulperazone.

He was discharged from ICU to general ward after 1 week. Daily dressing of the neck wounds was done. Serial CT scan revealed significant improvements. He was discharged home from hospital after 5 weeks. He was followed up in outpatient clinic 2 weeks after discharge and his tracheostomy was successfully decannulated. He recovered very well at 2 months from the initial presentation (Figure 3). His neck wounds healed via secondary intention. He was also reviewed at Internal Medicine outpatient clinic for management of his diabetes and hypertension.

DISCUSSION

Escherichia coli, *Klebsiella*, *Bacteroides* and *Clostridium* are bacteria strains that are associated with gas formation¹. These gases are mainly carbon dioxide and hydrogen being produced as byproducts of anaerobic respira-

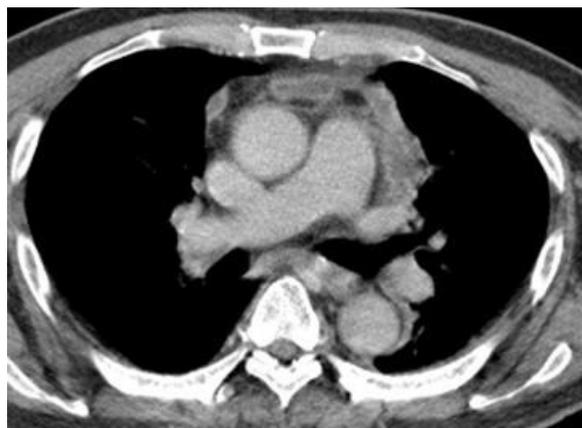


Figure 3: CT axial view of thorax demonstrating complete resolution after 2 months of therapy.

tion.¹ The accumulation of these gases can exert fatal compression on cardiovascular and respiratory system of the patient. The infection from this patient could be from dental origin as he had poor oral hygiene and there was no other source of infection or cutaneous wounds. We postulate the probable route of infection might have originated from his dental carries. Infections from the submandibular space spread below the anterior belly of the digastric muscles to involve the sublingual, retropharyngeal and parapharyngeal space. It further extends into the mediastinum along the carotid sheath and retropharyngeal space.

Occurrence of SVT in our patient was attributed by the mediastinal infection causing pericardial irritation resulting in cardiac electrical activity disturbance at the sinoatrial node as there were extensive anterior and superior mediastinum collections and air pockets.² Sepsis indirectly caused the SVT as well³. The systemic release of cytokines, endothelin-1, nitric oxide and prostanoids during sepsis causes myocardial dysfunction resulting in arrhythmia.⁴ Compression of the heart by adjacent tumor mass have been documented to cause arrhythmia.⁵ Gas formation and accumulation from the mediastinal extension of the cervical necrotizing fasciitis, surrounding the heart has also been postulated to exert the similar effect as well.

Surgical drainage can be performed either via cervical incisions, with or without a limited superior median sternotomy extension or a thoracotomy.⁶⁻⁸ More conservative approach such as percutaneous aspiration or drainage of the mediastinal abscess has also been previously reported.⁸ An alternative drainage approach with the insertion of a thoracostomy tube into anterior mediastinum via a small incision below xiphisternum to drain an anterior mediastinal abscess has also been reported.⁹ In our case, we utilized the open cervical approach without a median sternotomy extension or a thoracotomy as the abscess cavity were all interconnected and could be thoroughly drained via the cervical incision alone.

CONCLUSION

Extensive gas forming necrotizing retropharyngeal and parapharyngeal abscess extending into with mediastinal causing mediastinitis can lead to significant cardiac morbidity and mortality if not promptly treated as shown by our case where patient developed SVT. It is important to recognize the subtle clinical features early especially in a diabetic patient and prompt open surgical drainage and appropriate antibiotics can save life.

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Primary sinonasal mucosal melanoma – A diagnostic and histological conundrum.

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ABSTRACT

Primary sinonasal mucosal melanomas (PSMM), a rare subtype of melanomas offers significant diagnostic challenge clinically and histologically especially when amelanotic, as they can show many histologic mimics that require immunohistochemical and molecular studies to confirm the diagnosis. We report the case of a 50-year-old male presented with persistent left nasal blockage and epistaxis secondary to a fleshy and friable lobulated mass occupying the left nasal cavity and nasopharynx. The tumour was excised endoscopically and histology confirmed a malignant tumour consisting of small round blue cells with hyperchromatic nuclei, in solid sheets with areas of angiocentric pattern (H&E staining). The cells were positive for S100 protein and focally positive for HMB-45 and Melan A and a diagnosis of PSMM was made. However, he defaulted the subsequent radiotherapy and presented back a few months later with tumour recurrence locally and nodes metastasis. Despite undergoing radiotherapy, he died after two cycles due to an episode of acute coronary syndrome.

Keywords: HMB-45 protein, Melanoma, Amelanotic, Nasal Cancers, S100 protein, Radiotherapy

INTRODUCTION

Primary sinonasal mucosal melanomas is a rare subtype of melanomas which arise from melanocytic cells found in the mucous membranes, accounting for less than 1% of all melanomas and <5% of all sinonasal tract neoplasm.^{1, 2}

It offers significant diagnostic challenge for the clinician due to its non-specific clinical features such as epistaxis, nasal polyp, pain and nasal discharge which can be the usual complaints of sinonasal pathology. Similarly, it presents a diagnostic dilemma for clinicians especially when amelanotic, as they can show many histologic mimics that require immunohistochemical and molecular studies to confirm the diagnosis. We present a case of an aggressive primary sinonasal mucosal amelanocytic melanomas in a 50 year old Malay gentleman which was resected but recurred within a few months and discussed the

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diagnostic and management options of such malignancy.

CASE REPORT

A 50-year-old Malay businessman, with no known underlying medical illness presented to the Department of Otorhinolaryngology (ORL) outpatient clinic complaining of persistent left nasal blockage and epistaxis for four months. He was a chronic smoker for the past 30 years. He denied any alcohol consumption.

Naso-endoscopic examination revealed a fleshy and friable lobulated mass which was covered by slough occupying the left nasal cavity. A contrast enhanced Computed Tomography (CT) of paranasal sinuses was performed, which showed a heterogeneously enhancing lobulated mass occupying the left nasal cavity with expansion of the nasal cavity (Figure 1). There was associated deviation of the nasal septum to the right and scalloping of the medial wall of the left maxillary sinus with obliteration of the left ostiomeatal complex. Posteriorly, the mass was obliterating the left posterior nasal choana and left postnasal space. The mass was also seen crossing the midline to the right causing partial obliteration of the right posterior nasal choana. Superiorly, the mass extended into the ethmoid and sphenoid sinuses. There was no evidence of distant metastasis.

Microscopic examination of the tumour biopsy using H&E staining showed a cellular tumour mass covered by partially ulcerated nasal mucosa composed of small round blue cells arranged in solid sheets with hypercellular and hypocellular areas. Within the hypercellular areas, the tumour cells showed angiocentric pattern, whereas at the hypocellular areas the tumour cells were surrounded by myxoid stroma (Figure 2). The tumour cells displayed round hyperchromatic nuclei, some with prominent nucleoli and clear to eosinophilic cytoplasm. Tumour cells with

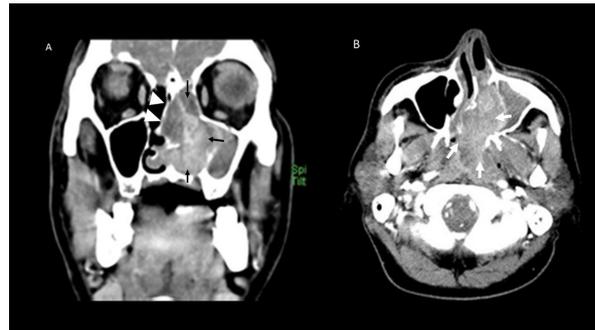


Figure 1: CT paranasal sinus in (A) coronal plane showing a heterogeneously enhancing lobulated mass occupying the left nasal cavity (black arrow) causing expansion of the cavity and right-sided deviation of the nasal septum (arrow head); (B) Axial image of the nasal cavity showing the mass (white arrow) extending into the nasopharynx, obscuring the left posterior nasal choana and nasopharynx.

intranuclear inclusion were also occasionally seen in areas. Mitotic figures were frequently seen including abnormal forms. There was no melanin pigment seen. The tumour cells were immunoreactive for S-100 protein and focally positive for HMB-45 and Melan-A (Figure 3). Other markers to rule out differential diagnoses of small round blue cell tumours of the sinonasal tract were negative (CK AE1&AE3, desmin, myogenin, FLI-1, CD99, chromogranin A, synaptophysin, LCA and Tdt). Histopathological diagnosis of primary sinonasal mucosal melanoma was confirmed with the absence of previous or concurrent melanocytic lesions elsewhere, particularly in the cutaneous and ocular sites.

The patient underwent endoscopic excision of the tumour under general anaesthesia.

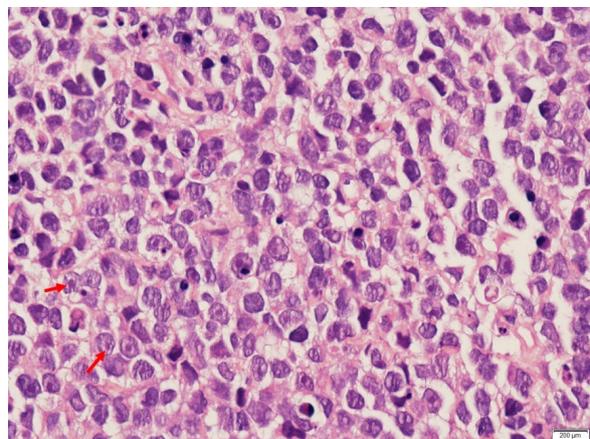


Figure 2: Malignant small round blue cell tumour with occasional malignant cells displaying prominent red-cherry nucleoli (arrow) (Hematoxylin and eosin stain, original magnification x 600).

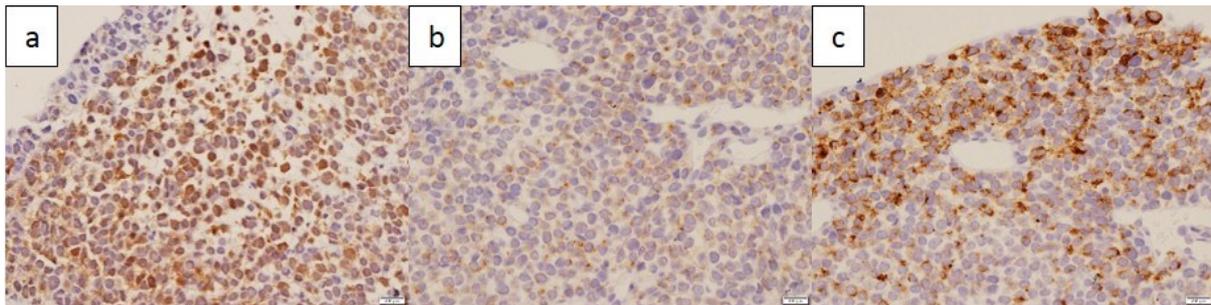


Figure 3: The malignant cells show strong diffuse cytoplasmic staining to a: S-100, b: focally for Melan-A and c: HMB-45 (Immunohistochemical stain, original magnification x400).

sia. Intra operatively, there was left nasal mass (Figure 4) superficially attached to the superior part of the left soft palate. It extended laterally to the left maxillary sinus and medial pterygoid plate; and superiorly to the anterior and posterior ethmoid sinuses. There was no direct tumour extension into the left orbit.

Unfortunately prior to commencement of radiotherapy, he presented to the Emergency Department with sudden onset chest pain and ST elevation on the electrocardiogram with a diagnosis of acute ST elevation myocardial infarction (STEMI). He underwent coronary angiogram and primary percutaneous coronary intervention on the same day and was discharged well with dual antiplatelet therapy. He defaulted subsequent ORL follow up for a few months and presented back with new complaints of progressive bilateral nasal

obstruction associated with epistaxis. A new left level II cervical lymph node measuring 2 by 2 cm was found. Naso-endoscopy revealed recurrence of the tumour within the entire left nasal cavity and nasopharynx. The patient was discussed at a multidisciplinary tumour board and it was noted that the tumour had now involved the left orbit superiorly and the pterygoid plates posteriorly during the radiotherapy CT simulation. As the patient has had a recent STEMI, he was deemed unfit for surgery and proceed with radiotherapy without tumour debulking. He managed to complete two cycles of radiotherapy before succumbing to another episode of an acute coronary syndrome.

DISCUSSION

PSMM is extremely rare with a reported incidence of 0.5 per million per year and carries a

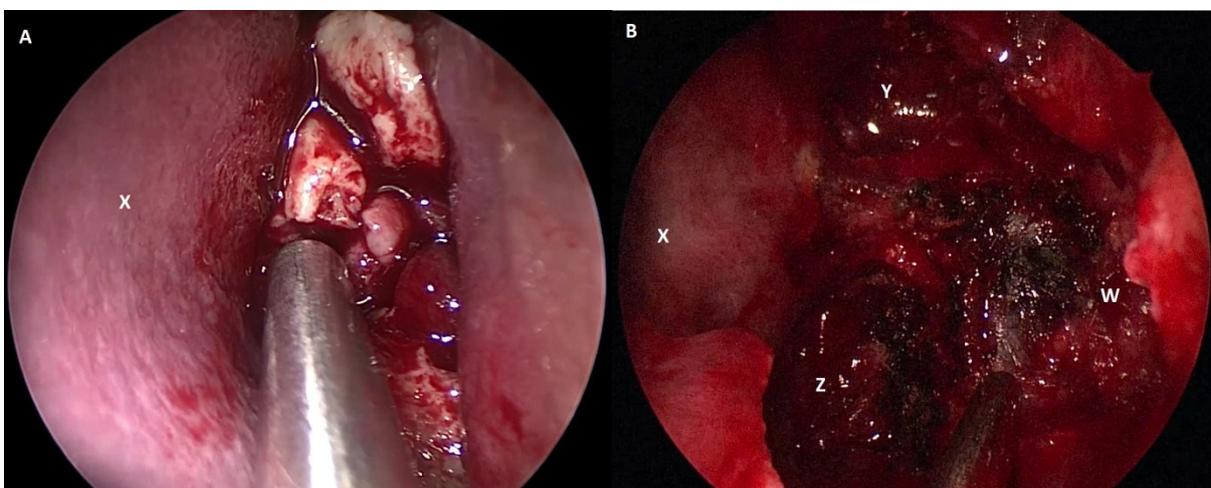


Figure 4: (A) Intraoperative endoscopic view of the tumour prior to excision and (B) after completion of excision. (W: maxillary sinus with removed lateral nasal wall; X: nasal septum; Y: opened sphenoid sinus; Z: nasopharynx.)

poor prognosis.³ Due to non-tumour specific signs and symptoms, the patients then to present at an advanced stage of the tumour with poor overall survival. Regional or distant metastases are seen in 80% of patients at the time of diagnosis with five-year survival of less than 10%.⁴ As compared to cutaneous (80.8%) and ocular melanomas (74.6%), PSMM have the lowest percentage of five-year survivals (25%).²

Risk factors for developing PSMM have not been fully identified. Ultraviolet radiation, a well-known risk factor for cutaneous (sun-exposed skin) melanoma is unlikely to play a significant role in PSMM since the mucosa are not exposed to constant sunlight. Viral infections such as human papilloma viruses, human herpes viruses and polyomavirus have been implicated with pathogenesis of mucosal melanomas but the evidence have not been consistent.^{5, 6} Exposure to formaldehyde was suggested as a possible risk factor for sinonasal mucosal melanoma, since there were cases reported among workers exposed to this substance.⁷

The most frequent sites of PSMM are in the maxillary sinus, nasal cavity, and nasal septum.⁸ Majority of patients have symptoms of nasal obstruction or epistaxis or both. On endoscopic examination nasal melanomas show variable findings from small to bulky friable masses which can easily bleed on contact. Clinical appearance of the tumours can also mimic benign nasal polyps.⁹

Histologically, PSMM can show a wide range of histological features which includes small round blue cell tumour. Diagnosis of small round blue cell tumours of the sinonasal tract are often difficult and challenging. The differential diagnoses include olfactory neuroblastoma, sinonasal undifferentiated carcinoma, undifferentiated (lymphoepithelioma-like) carcinoma, lymphoma, Ewing's sarcoma/peripheral neuroectodermaltumour (PNET)

and rhabdomyosarcoma.¹⁰ Amelanotic appearance which can also be seen in PSMM cases makes diagnosis even more difficult and challenging.

A panel of antibodies for relevant immunohistochemical stains to exclude the differential diagnoses are essential for definitive diagnosis. In our case, LCA and cytokeratin were performed to rule out lymphoma and carcinoma respectively. Desmin, myogenin, FLI-1, CD99, chromogranin A and synaptophysin were performed to exclude rhabdomyosarcoma, Ewing's sarcoma/PNET and olfactory neuroblastoma. In this case, the diagnosis of MM was concluded from the immunohistochemistry studies which showed positivity for S-100 protein, HMB-45 and Melan-A.

Among immunohistochemistry panel for melanomas, HMB-45 showed almost 100% specificity, as compared to Melan-A which is less specific. A study by Morris *et al.* concluded that PNL-2 is a highly sensitive marker for mucosal melanoma.¹¹ This marker showed similar specificity with Melan-A and superior than S-100 protein. Therefore, the authors suggested the inclusion of PNL-2 as one of the important immunohistochemical panel in the evaluation of primary MM.

Genetic differences have been shown between cutaneous melanomas and MM. *BRAF* mutations, in particular the *BRAF* V600E mutation were frequently detected in cutaneous melanomas. On the other hand, high frequency of mutations of the *KIT* gene were seen in cases of MM.¹² These findings support the role of targeted therapy with tyrosine kinase inhibitors such as c-KIT blockers in patients with MM.

Exclusion of metastatic lesion from primary cutaneous or ocular melanoma is essential when diagnosing primary MM. This becomes even more challenging with the possibility of regressed primary cutaneous mela-

nomas that have metastasized to mucosal sites. Therefore, in cases without previous history of melanoma, a thorough examination of the whole-body skin and eye are necessary to exclude the presence of cutaneous or ocular primary melanoma.

CONCLUSION

In conclusion, primary MM of the sinonasal is an uncommon yet aggressive malignant tumour of the respiratory tract. Clinically, the presentation is rather non-specific and histologically, it can show a wide range of histological features from pleomorphic, spindle to undifferentiated small blue cell tumour. This case reminds us that melanoma truly is the great mimicker, both clinically and histologically.

ACKNOWLEDGEMENT

The authors would like to thank the Director of Health Malaysia for permission to publish this paper. The authors declare that there is no conflict of interest to disclose.

Poster abstract has been presented at the 3rd annual scientific meeting of International Academy of Pathology, Malaysian Division.

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Imaging Guided Thoracic Epidural Catheter Insertion In A Morbidly Obese Patient Undergoing Elective Thoracotomy.

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ABSTRACT

A 26-year old morbidly obese male with body mass index of 39 kg/m² was scheduled for an elective left thoracotomy for large loculated empyema. During pre-anaesthetic assessment, he had predictors of a difficult regional anaesthesia upon back examination such as indistinct thoracic spinous processes and intervertebral spaces. We planned for a combination of radiological imaging-assisted regional anaesthesia (mid-thoracic epidural catheterisation) and general anaesthesia for him. Prior to the procedure, the skin-epidural space distance at level T5 was measured as 8.32 cm from his transverse computed-tomography. A pre-induction ultrasound localisation of mid-thoracic spinous process and interspinous space (T5-6) was done. Epidural space was identified at the needle length of 8.5 cm (0.18 cm more than the CT-scan derived skin-epidural space estimation) and catheterised successfully, general anaesthesia with one-lung ventilation ensued. Pre-emptive thoracic epidural analgesia instituted and surgery was uneventful. Multi-modal analgesia applied and he was discharged from Intensive Care Unit four days later.

Keywords: thoracic epidural, morbid obesity, computed tomography, ultrasound.

INTRODUCTION

The prevalence of obesity in Malaysia is approximately 20% and many of them will require anaesthesia at any point of their life.¹ Generally, an epidural catheterisation provides perioperative analgesia, reduction of postoperative respiratory and sympathetic-related complications associated with pain.²

These beneficial profiles promotes a more steady and enhanced systemic recovery in comparison of administering a conventional intravenous opioid. However, localising the epidural space correctly in a morbidly obese patient can be technically challenging for the anaesthesiologist in ensuring effective analgesia and avoiding potentially catastrophic morbidity such as spinal cord injury. More so when it is done at the thoracic region, hence the usage of radiological imaging may improve the success rate of performing it. We report our experience of a successful mid-thoracic epidural catheterisation in a young

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morbidity obese patient undergoing an elective thoracotomy after a preoperative assessment of the skin-epidural space depth from thoracic CT-scan and pre-puncture ultrasound localisation of the thoracic spinous process and interspinous space.

CASE REPORT

A 26-year old morbidly obese male (BMI: 39 kg/m²), scheduled for an elective left thoracotomy for large loculated empyema. The patient was evaluated two days prior to surgery. He suffered prior community acquired pneumonia complicated with left lung empyema, previous transient ischaemic attack and hypercholesterolaemia.

Preoperatively, he denied any symptoms of obstructive sleep apnoea but claimed had snoring. Pre-anaesthetic assessment of his vital signs were: heart rate of 80 beats/min, non-invasive blood pressure of 130/84 mmHg, pulse oximetry oxygen saturation level (SpO₂) of 98%. He was clinically comfortable and respiratory assessment was consistent with left lung empyema. Bedside airway test revealed predictors of difficult bag-valve-mask (BVM) ventilation such as excess adipose tissues on the cheeks and neck circumference of 42 cm but otherwise he had Mallampati Class II with unrestricted neck flexion and extension. Thoracic spinous processes and intervertebral spaces were not appreciated on back examination due to excessive subcutaneous fat. Lung function tests revealed restrictive lung disease and a fair arterial blood gas. Other blood investigations such as full blood count, coagulation and renal profile were within normal limits. We opted for radiological imaging assisted mid-thoracic epidural catheterisation and analgesia (TEA) with general anaesthesia (GA) and one lung ventilation (OLV) for this patient. Despite having a difficult thoracic epidural anatomy, this method was chosen for its known post-operative pain relief, respiratory and circula-

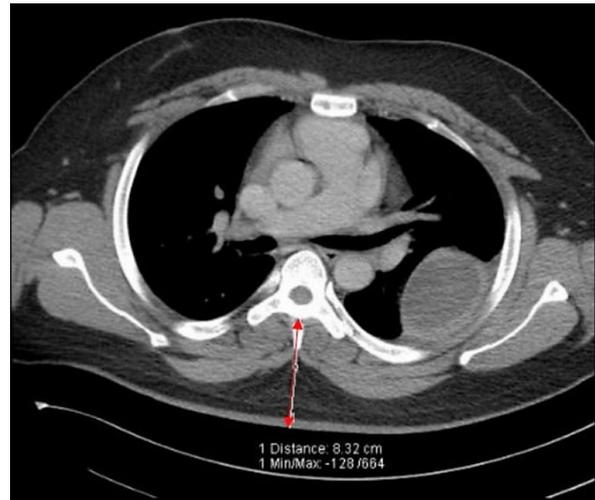


Figure 1: Transverse computed tomography of the mid-thoracic plane at level T5. Red arrow represents the perpendicular distance from skin to epidural space measuring at 8.32 cm.

tory benefits in an obese patient. The patient was also counselled for patient controlled analgesia morphine in view of an unsuccessful attempt of thoracic epidural catheterisation and he consented to this. The radiologist assisted us by measuring the distance from skin to epidural space at level T5 from his transverse computed tomography (CT-scan) and it measured as 8.32 cm (Figure 1). Anti-aspiration prophylaxis consisted of tablet ranitidine 150 mg and tablet metoclopramide 10 mg were given the night and one hour prior to the surgery. A written and informed consent for anaesthesia was taken after explaining the anaesthetic modes and their perioperative implications.

On the day of the surgery, pre-induction monitoring were applied, these included five lead ECG, invasive blood pressure (inserted under aseptic technique at the left radial artery), pulse oximetry and capnography. Baseline vital signs were recorded: heart rate 85 beats/min, invasive blood pressure 134/82 mmHg and room air saturation was 98%. An 18-G intravenous cannula was in situ and Hartmann's solution was administered. On sitting up position, the mid-thoracic spinous process and interspinous spaces were visualised during pre-induction with ultra-

sound using a curvilinear probe (2-5 mHz) orientated transversely by tracking from the cervical (caudad direction) and lumbar region (cephalad direction) on the median plane. Level T5-T6 interspinous space was localised and marked at the midline. A paramedian sagittal oblique view was attempted but fail to visualize and identify the ligamentum flavum-dura matter unit. Under aseptic technique, the epidural space was located at the midline using 18-G Touhy needle of 8.8 cm length (from combined spinal-epidural set kit). The needle depth was 8.5 cm when the 'loss of resistance' to air was appreciated. Negative aspiration for blood and cerebrospinal fluid was confirmed, epidural catheter was inserted and placement was further confirmed with the 'hanging drop technique'. The epidural catheter was anchored to the skin at 13 cm with 4.5 cm of the distal end left in the epidural space.

He was placed on a troop elevation pillow and pre-oxygenated with 100% oxygen for five minutes. Induction, paralysis, two-handed BVM ventilation performed. Direct laryngoscopy showed Cormack and Lehane Grade I, a left-sided double lumen tube (DLT) inserted with confirmation by auscultation and fiberoptic bronchoscopy. He was positioned to the right lateral with adequate manpower and DLT placement was re-checked again with fiberoptic bronchoscopy. All pressure points were protected with silicone gel pads. Ropivacaine 0.37% of 3 ml aliquots were administered epidurally 10 minutes prior to surgical incision and every 10 minutes after surgery started with a total of 9 ml. General anaesthesia was maintained with sevoflurane and OLV commenced on the right lung.

No haemodynamic instability encountered, a cocktail of ropivacaine 0.1% and fentanyl 2 µg/ml infusion at 8 to 10 ml/hour was initiated at one hour after surgery started. Surgery was uneventful and lasted for two hours. He was reversed and extubated in a

reversed Trendelenburg position and shifted to Intensive Care Unit (ICU) for observation. TEA was continued for three days with paracetamol and oral tramadol prescribed. Pain score was 0 to 2/10 with a satisfactory incentive spirometry of more than 2L achieved. He was discharged from ICU four (4) days later.

DISCUSSION

Patients planned for thoracotomy will routinely have a preoperative chest CT-scan, therefore an estimation of the CT-derived distance between skin to the epidural space can be estimated. Carnie et al described a concept to calculate the depth of needle insertion at the thoracic midline approach by using Pythagorean triangle trigonometry when perpendicular distance (measured from skin to the intended thoracic epidural space) and $\sin \alpha$ (angle between the needle and thoracic vertebral body) are known.³ They concluded that CT-derived depth appeared to be greater by the range of 0.03 to 0.49 cm than the actual depth. There were no correlations seen between either the CT-derived or the actual depth of the epidural space with age, weight, height or BMI. Sung et al used the same principles of trigonometry and found that there was a significant correlation between both the estimated CT-derived distance and the actual depth of the needle in performance of mid-thoracic epidural catheterisation.⁴ In contrary, they demonstrated an actual depth of the needle reaching epidural space tended to have 1.25 times longer than the estimated distance on the CT-scan film. It showed a significant correlation between the actual length with both weight and BMI but not to age and height. In our case, the actual depth of the needle reaching the epidural space was 0.18 cm greater than the CT-scan derived distance between skin to the epidural space estimation. This finding is consistent with the study done by Sung et al. Practically, one would expect that the tissue of the back in a morbidly obese patient would be more compressible in supine position during CT-

imaging as compared to when they are sitting up during thoracic catheterisation. This potential differential compression based on the patient's position may support the fact that the actual depth of the needle reaching epidural space is longer than the estimated distance on the CT-scan film and anaesthesiologist should be aware of this.

Ultrasound imaging of the spinal region does not only identify the relevant landmarks but also able to provide an estimation of distance from skin to ligamentum flavum-dura matter unit (ultrasound depth), optimum insertion angle and insertion point of the epidural needle.^{5,6} However, visualisation of the deeper structures such as ligamentum flavum-dura matter unit, epidural space and intrathecal space can be challenging in the morbidly obese patients. In our case, we used the ultrasound to facilitate the localisation of mid-thoracic spinous process and interspinous space as it was difficult to locate the deeper relevant structures. In obese patients, deeper structures are often obscured due to the beam attenuation of ultrasound waves which had to penetrate through a longer distance of soft tissues. Other reported factors that contributed to this poor imaging quality in the presence of excessive adipose tissue are: 1) the effect of phase aberration of sound field secondary to variable speed of sound in the overlying non-homogenous and irregularly-shaped fat layers and 2) the reflection of the ultrasound beam because of differing acoustic velocity at the fat-muscle interface.⁷

It is well reported that the ultrasound depth of skin to epidural space can be estimated if the ligamentum flavum-dura matter unit could be identified. Nishiyama showed a corrected shorter ultrasound depth ranging from 0.8 to 2.5 cm than the needle depth (distance from the skin to the tip of needle) for a thoracic epidural catheterisation in bariatric surgery among the morbidly obese.⁸ Rasoulian *et al* found that the skin to epidural

depth measured by an ultrasound had the tendency to underestimate the actual depth using needle among their thoracic surgery patients. This was probably secondary to probe-induced tissue compression or the intrinsic thickness of the ligamentum flavum.⁹ However, Sahota *et al* demonstrated that ultrasound measured depth ranges from -14% to +17% of the actual needle depth, which was comparable in both sonographic transverse median and paramedian sagittal oblique plane.¹⁰ The visualisation of the ligamentum flavum-dura matter unit and epidural space while performing a paramedian sagittal oblique view with the ultrasound was attempted in our case but to no avail, probably due to the presence of excessive adipose tissue. Applying different planes to estimate the ultrasound depth may be beneficial in those with poor sonoanatomy.

CONCLUSION

In conclusion, CT-derived distance between skin to epidural space with ultrasound localisation of the spinous process and interspinous space may be helpful as a guide and adjunct in mid-thoracic epidural catheterisation in morbidly obese patients for a better success rate and a favourable outcome.

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(Refer to page 163)

Answer: Purple urine syndrome

The urinalysis showed a pH of 7.5, specific gravity of 1.020 and it was positive for leucocytes and nitrites. The urine culture had significant growth of *Klebsiella pneumoniae*. She was treated with a course of antibiotics and had her urinary catheter and bag changed. Subsequently her urine colour became yellow and cleared without any complications.

Purple urine bag syndrome (PUBS) is an uncommon yet interesting phenomenon was first reported in 1978 and has since been well documented.¹⁻³ The reported prevalence particularly in institutionalised patients with long-term urinary catheters can be as high as 9.8%.⁴ Factors associated with PUBS include female gender, constipation, alkaline or acidic urine, institutionalization and the presence of long-term urinary catheterization.²

PUBS can occur due to the presence of indigo and indirubin pigments. These blue and red pigments are from indoxyl sulphate, which had been metabolized from the activity of indoxyl sulphatase with certain bacteria in the urine like *Klebsiella pneumoniae* and *Escherichia coli*.^{2,3} As with our patient, management includes reassuring the patient and caregiver and treating with appropriate antibiotics based on bacteriological cultures and sensitivity and with changing the urinary catheter and bag.

Although usually benign, this image highlights the importance of recognizing this intriguing syndrome as a urinary tract infection, which occurs commonly with improper urinary catheter care.

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(Refer to page 158)

Answer: Cutaneous Larvae Migrants (CLM)

The diagnosis is cutaneous larvae migrans (CLM). The thread-like lesion below the skin is the pathognomonic of the disease.

The disease is due to nematode parasite infestation, particularly the hookworm. It usually penetrates the human body through a breach of epidermis or even on an intact bare foot. It migrates from the port of entry subcutaneously, as the name implies. The itchiness symptom also 'migrates'. It is commonly thought or suggested that the intense itch was due to the migration of the parasite under the skin but in truth, the pathophysiology of the symptom is due to the host immune response to the larvae and their byproducts.¹

CLM is common in tropical regions like South East Asian countries including Malaysia, and more prevalent in low- and middle-income countries.² Sporadic cases do occurred in Western population.³ Besides the geographical distribution, there is no sex, race or age predilection except it tends to occur more commonly in children, understanding the nature of activity in their age group.

CLM is a self-limiting disease and the prognosis is excellent. The larvae do not survive more than 8 weeks. Treatment usually is for symptomatic relief and prevention of secondary bacterial infection.³ Topical treatments require localization of the lesion and may need repeated application. Whenever applicable, oral albendazole or ivermectin are curative.⁴

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