Vol. 45 No. 11 November 2016

Annals Academy of Medicine Singapore

ANNALS
ACADEMY OF MEDICINE, SINGAPORE

COMMITTED TO SPECIALIST EDUCATION AND TRAINING SINCE 1957

DIAMOND JUBILEE CELEBRATION 1957-2017 60 years

VOLUME 45 | NUMBER 11 | FREE PAPERS | NOVEMBER 2016

MCI(P) 022/11/2016

"Every great achievement is but a small peak in the mountain range of contributions."

Dale T Mortensen (1939 – 2014)
American economist

Reproduced with permission from:
A/Prof Chen Fun Gee

Please see inside Contents for the full list of articles.

Professional **M**edical **C**ongress **O**rganisation for **Professionals**....

ACADEMY OF MEDICINE, SINGAPORE
– YOUR PARTNER IN MEDICAL EVENTS

Academy of Medicine, Singapore (AMS) is a professional institution of medical and dental specialists devoted to advancing the art and science of medicine in Singapore by promoting and maintaining the highest professional standards of competence and ethical integrity, thereby providing the highest quality of patient care for the people in Singapore.

The Academy organises congresses and scientific meetings to enhance the continuing professional development of specialists in Singapore including the Singapore-Malaysia Congress of Medicine biennially.

The Professional Medical Congress Organisation (PMCO) department is an integral arm which specialises in medical conference management and provides professional conference management for any scientific meetings organized by any medical societies, charities and associations.

Our PMCO unit is led by an experienced team of people with event management qualifications and experiences to ensure that each event is well managed and delivered professionally. To date, AMS has organized and managed over 200 national and regional events that include trade exhibitions.

- Secretariat services
- Accounts management
- Venue management
- Event conceptualization and planning
- Website design services, with online registration system
- Marketing, publicity and publication
- Speakers' & delegates' management
- Abstract & exhibition management
- On-site event management & support

Contact us at
Academy of Medicine, Singapore
PCO Services, 81 Kim Keat Road #12-00, NKF Centre, Singapore 328836
Tel: (65) 6593 7882 Email: events@ams.edu.sg Website: www.ams.edu.sg

Editorial

Marijuana Abuse in Singapore

Christopher CS Cheok, [1]*MBBS, MMED (Psychiatry)*, Jimmy Lee, [2]*MBBS, MMed (Psychiatry), FAMS*, Gomathinayagam Kandasami, [1]*MBBS, MRCPsych, DPM*

Marijuana has taken the spotlight in recent years fuelled by calls by some governments[1] to legalise and permit its use for medical purpose, and decriminalise the abuse of the substance. Decriminalisation refers to reducing the criminal sentences of convicted users or diverting them to treatment rather than incarceration. Marijuana has recently been legalised for medical use in 25 states in the United States.[2] In the European Union, there is a grassroots movement towards decriminalisation[3] and in Portugal, drug use has been decriminalised since 2001. In Australia, formal clinical trials using marijuana have started.[4] In Singapore, marijuana has been a Schedule I drug since 1961 and the use or trafficking of the substance carries harsh penalties.

The main psychoactive substance of marijuana is tetrahydrocannabinol (THC). Marijuana can be used by smoking, vaporisation and extracts have been included in food. THC induces a "high", a change in perception, euphoria and an increase in appetite. Short-term side effects may include a decrease in short-term memory, dry mouth, impaired motor skills, red eyes, and feelings of paranoia or anxiety. Long-term side effects include addiction, decreased cognitive ability in those who started as adolescents and psychosis. THC can induce arteritis and it increases the workload of the heart. There is evidence that it can precipitate myocardial infarction in persons at high risk of cardiovascular disease and ischaemic stroke in those at risk for cerebrovascular disease.

Advocates for using marijuana for medical purposes propose that marijuana is useful in autism, certain cancers, epilepsy, spasticity in multiple sclerosis and chemotherapy-associated nausea.[5] However, there has been no rigorous clinical trial that has evaluated its benefits. To date, the United States Federal Drug Administration has not approved marijuana as a safe and effective drug for any indication.[6] A synthetic version of THC has been approved for chemotherapy-associated nausea and increasing appetite in acquired immune deficiency syndrome (AIDS) patients. Internationally, no state or national medical association has endorsed the use of marijuana for medical purposes. However, most would support further rigorous clinical research in this area.

The regulation of the use of marijuana is a complex issue and the medical argument cannot be taken in solitude. Beyond the medical benefits of any molecule, the impact of the substance on society must be considered. Drug abuse and illicit substance control has many facets that includes legal, healthcare, education, political and rehabilitation dimensions. Buprenorphine, an opioid used to treat heroin dependence was legally available in Singapore from 2002 to 2006. Beyond its use to treat heroin addicts, it also led to widespread abuse of the drug obtained from doctors, diversion of legally obtained buprenorphine,[7] increase in blood-borne viral infections from intravenous drug abuse and case reports of unusual infection pattern not usually seen in Singapore.[8] Doctors were also prosecuted for failure to provide appropriate duty of care when prescribing buprenorphine to patients. Advocates for marijuana cite that the harm of the substance is low. In territories where illicit drugs have been decriminalised or where liberal policies prevail, drug abuse amongst teenagers and young adults has correspondingly increased.[9]

In Singapore, despite our drug policies, there has been an increase in drug arrests and trafficking of some substances. In the first half of 2015, the Central Narcotics Bureau[10] reported that marijuana seizures increased 174% from 8.81 kg to 24.12 kg; there were 1717 drug abuse arrests representing an increase of 10% compared to the first half of 2014. About 37% (629) of all drug abusers arrested were new abusers. Among the new abusers, 71% (446) were below 30 years old. This trend in drug abuse is caused by several factors. Firstly, the way illicit drugs are portrayed in traditional and social media have taken on a positive spin. There is rising affluence and affordability of drugs by youth and young adults. The internet has also made information and misinformation widely accessible. Our youths are also increasingly exposed to a multitude of alternative views and

[1]National Addictions Management Service, Institute of Mental Health, Singapore
[2]Department of General Psychiatry 1 and Research Division, Institute of Mental Health, Singapore
Address for Correspondence: Dr Christopher Cheok, National Addictions Management Service, Block 9 (Level 1), Buangkok Green Medical Park, 10 Buangkok View, Singapore 539747.
Email: Chris_CHEOK@imh.com.sg

attitudes when travelling, studying overseas or interacting with foreigners.

Currently, the medical evidence for the use of marijuana for treating medical conditions is weak. Analogues of THC, the psychoactive substance in marijuana have been approved for restricted indications. Even if medical evidence emerges in the future, any change in policy must be weighed against the wider impact to society and the definite risk of diversion and abuse of the substance. The Institute of Mental Health (IMH) and the National Addictions Management Service (NAMS) have recently reviewed the literature on marijuana. The findings,[11] summarised in this editorial have been reported in the press and are in the process of publication in medical journals. Based on the current medical evidence, IMH and NAMS support the current regulations restricting the use of marijuana for medical use in Singapore.

REFERENCES

1. Liberal Party of Canada. We will legalize, regulate, and restrict access to marijuana. Canada: Liberal Party of Canada. Available at: https://www.liberal.ca/realchange/marijuana/. Accessed on 12 August 2016.
2. National Conference on State Legislatures. State Medical Marijuana Laws. Washington (USA): National Conference on State Legislatures; 2016. Available at: http://www.ncsl.org/research/health/state-medical-marijuana-laws.aspx. Accessed on 12 August 2016.
3. United Nations Drug Control. Drug and Democracy Programme. Cannabis policy reform in Europe. Amsterdam (NL): Transnational Institute, Drug and democracy programme; 2014. Available at: http://www.undrugcontrol.info/en/publications/legislative-reform-series-/item/6007-cannabis-policy-reform-in-europe. Accessed on 12 August 2016.
4. New South Wales Government. Clinical Trials: Medical Use of Cannabis. Australia: New South Wales Government Health; 2015. Available at: http://www.health.nsw.gov.au/cannabis/Documents/fs-cannabis-trials.pdf. Accessed on 12 August 2016.
5. Liu QS. Medical Marijuana-Opportunities and Challenges. Biochem Pharmacol (Los Angel) 2016;5:e182.
6. Federal Drug Administration. FDA and Marijuana. United States: US Department of Health and Human Services; 2016. Available at: http://www.fda.gov/NewsEvents/PublicHealthFocus/ucm421163.htm. Accessed on 12 August 2016.
7. Winslow M, Ng WL, Mythily S, Song G, Yiong HC. Socio-demographic profile and help-seeking behaviour of buprenorphine abusers in Singapore. Ann Acad Med Singapore 2006;35:451-6.
8. Yang SS, Lee K. Unusual complication of intravenous Subutex abuse: two cases of septic sacroiliitis. Singapore Med J 2008;49:e343-6.
9. Hasin DS, Wall M, Keyes KM, Cerda M, Schulenberg J, O'Malley, et al. Medical marijuana laws and adolescent marijuana use in the USA from 1991 to 2014: results from annual, repeated cross-sectional surveys. Lancet Psychiatry 2015;2:601-8.
10. Central Narcotics Bureau Singapore. Drug Situation Report Jan to Jun 2015. Singapore: Central Narcotics Bureau Singapore; 2016. Available at: http://www.cnb.gov.sg/drugsituationreport/drugsituationreport2015.aspx. Accessed on 12 August 2016.
11. Institute of Mental Health. A Literature Review of Cannabis. Singapore: Institute of Mental Health; 2016. Available at: https://www.mfa.gov.sg/content/dam/mfa/images/om/geneva/A%20Literature%20Review%20On%20Medical%20Cannabis.pdf. Accessed on 23 August 2016.

Original Article

Prevalence and Risk Factors of Caregiver Dependence among Older Adults in a Southeast Asian Population

Louisa Picco, [1]*MPH*, Edimansyah Abdin, [1]*PhD*, Janhavi A Vaingankar, [1]*MSc*, Shirlene Pang, [1]*MSc*, Saleha Shafie, [1]*BSSci*, Rajeswari Sambasivam, [1]*BPsy*, Siow Ann Chong, [1]*MBBs, M.Med, MD*, Mythily Subramaniam, [1]*MBBS, MHSM*

Abstract

Introduction: Currently very little is known about the prevalence or magnitude of caregiver dependence in Singapore and thus, there is a need to fill this gap in this multiethnic ageing population. This study aims to determine the prevalence and risk factors of caregiver dependence among older adults in Singapore. Materials and Methods: Data were used from the Well-being of the Singapore Elderly (WiSE) study, a nationally representative, cross-sectional survey among Singapore residents aged 60 years and above. Caregiver dependence was ascertained by asking the informant (the person who knows the older person best) a series of open-ended questions about the older person's care needs. Results: The older adult sample comprised 57.1% females and the majority were aged 60 to 74 years (74.8%), while 19.5% were 75 to 84 years, and 5.7% were 85 years and above. The prevalence of caregiver dependence was 17.2% among older adults. Significant sociodemographic risk factors of caregiver dependence included older age (75 to 84 years, and 85 years and above, *P* <0.001), Malay and Indian ethnicity (*P* <0.001), those who have never been married (*P* = 0.048) or have no education (*P* = 0.035), as well as being homemakers or retired (*P* <0.001). After adjusting for sociodemographic variables and all health conditions in multiple logistic regression analyses, dementia (*P* <0.001), depression (*P* = 0.011), stroke (*P* = 0.002), eyesight problems (*P* = 0.003), persistent cough (*P* = 0.016), paralysis (*P* <0.001), asthma (*P* = 0.016) and cancer (*P* = 0.026) were significantly associated with caregiver dependence. Conclusion: Various sociodemographic and health-related conditions were significantly associated with caregiver dependence. Dependent older adults will put greater demands on health and social services, resulting in greater healthcare expenditures. Hence, effective planning, services and support are crucial to meet the needs of dependent older adults and their caregivers.

Ann Acad Med Singapore 2016;45:486-94

Key words: Epidemiology, Multiethnic, Singapore

Introduction

Globally, people are living longer and it has been estimated that the number of people aged 60 years and above will more than double, from 841 million people in 2013 to more than 2 billion in 2050.[1] Various chronic non-communicable diseases are associated with ageing including heart disease and cancers, and whilst these can often contribute to mortality, others such as dementia, stroke and various mental disorders can result in years lived with disability and associated burden.[2] For some older adults, these non-communicable diseases do not have a huge impact on their functioning, allowing them to largely remain independent. For others, however, prolonged and more permanent functional limitations result in them becoming dependent on a caregiver.

Dependence is most commonly defined as the "need for frequent human help or care beyond that habitually required by a healthy adult".[3] Some studies have defined and assessed dependence as a composite measure of functional disability whereby help is needed to perform activities of daily living (ADL).[4,5] Others state that while dependence is strongly linked to disability, whereby disability is often a significant contributing factor to dependence, one can have a disability without being dependent. Currently, there is no

[1]Research Division, Institute of Mental Health, Singapore
Address for Correspondence: Ms Louisa Picco, Research Division, Institute of Mental Health, Buangkok Green Medical Park, 10 Buangkok View, Singapore 539747.
Email: louisa_picco@imh.com.sg

gold standard, standardised definition or measure to assess dependence, making comparisons across studies difficult.

Research has consistently shown that dependence or functional disability is associated with various sociodemographic correlates including age, gender, education and marital status.[5-7] Being dependent is also associated with various health conditions, with the most significant contributor being dementia.[5-8] Currently, very little is known about the prevalence of caregiver dependence in Singapore and therefore, understanding more about the predictors or determinants of caregiver dependence among older adults is essential to future prevention, long-term care, policy making and planning. Given that caregivers of older adults in Singapore experience significant burden as a result of their caregiving role,[9] efforts to reduce and alleviate this burden, and support caregivers of dependent older adults are needed.

Singapore is a multiethnic, developed country in Southeast Asia. In 2013, the resident population was 3.85 million, consisting predominantly of Chinese (74.2%), Malays (13.3%) and Indians (9.1%), while other ethnic groups constitute approximately 3.3% of the population.[10] In 2014, Singapore residents aged 65 years and above made up 11% of the total resident population, a figure that has nearly doubled since 1990[10] and is expected to continue to increase. An ageing population and a decrease in fertility rates in Singapore will result in more people becoming dependent on caregivers and fewer people being able to take on a caregiving role. It is estimated that the older adult population will triple to 900,000 by 2030, while there will only be 2.1 working-age citizens for each citizen aged 65 years and above.[11] Dependent older adults will put greater demands on health and social services, not to mention caregivers themselves. This will result in several challenges in the future, including greater healthcare expenditures. At the same time, it highlights the critical role caregivers play in elder care.

Data for this study was extracted from the Well-being of the Singapore Elderly (WiSE) study, a population-based, cross-sectional study that established the prevalence of dementia among residents aged 60 years and above in Singapore. The aim of the current study was to determine the prevalence and risk factors of caregiver dependence among older adults in Singapore.

Materials and Methods

Study Design and Participants

The WiSE study was a single phase, cross-sectional survey of Singapore residents (citizens and permanent residents) aged 60 years and above that was conducted between August 2012 and December 2013. Ethical approval was obtained from the relevant institutional review boards (National Healthcare Group Domain Specific Review Board and the SingHealth Centralised Institutional Review Board).

Respondents were randomly selected via a national administrative database provided by the Ministry of Health that maintains the names and sociodemographic details such as age, gender, ethnicity and addresses of all residents in Singapore. The sample was inclusive of community-dwelling older adults as well as those residing in nursing homes, daycare centres or hospitals at the time of the survey. Residents aged less than 60 years, those who were living outside of Singapore and were unable to be contacted due to incomplete or incorrect addresses, those who were unable to complete the interview in one of the specified languages or dialects, and all foreigners were excluded from the survey.

A probability sample was randomly selected using a disproportionate stratified sampling design with 12 strata defined according to ethnicity (Chinese [38.5%], Malay [30%], Indian [30%], Others [1.5%]) and age groups (60 to 74, 75 to 84, and 85 years and above). Residents aged 75 years and above, and Malays and Indians were oversampled to ensure that a sufficient sample size would be achieved to improve the reliability of estimates for the subgroup analyses and to account for cultural differences in the 3 main ethnic groups in Singapore. A target sample size of 2500 was estimated to be adequate, based on the previous prevalence rate of dementia in Singapore being 5.2%,[12] as well as for subgroups by age and ethnicity. A total of 2565 respondents completed the study, yielding a response rate of 65.6%. Of these respondents, 2421 had an informant who completed the requisite interview and it was these respondents who were included in the current study.

In addition to each selected respondent, an informant was also chosen to participate in the study. An informant was defined as "the person who knows the older person best" and was someone who could provide the clearest and most detailed account of the older person's circumstances; the priority was a co-resident or family member in close contact with the older person. The actual amount of time spent (i.e. the person who spent the most time) with the older person was used as a criterion to decide on the best informant.

Written informed consent was obtained from all respondents (older person and the informant). For each older person who was not cognitively capable of providing informed consent, written consent was obtained from a legally acceptable representative or next-of-kin. Information pertaining to the WiSE methodology has been described in greater detail in a previous article.[13]

Measures

The WiSE study adopted the 10/66 Dementia Research

Group protocol,[14] which has previously been validated in China, India and Malaysia. Given that Chinese, Malays and Indians are the 3 main ethnic groups in Singapore, it stood to reason that this instrument would be best suited to our population. Culturally adapted versions of the instruments were used as part of our research and the specific measures administered in the current study are described in more detail below:

i) Geriatric Mental State (GMS): a semi-structured clinical interview which provides both dementia (as determined by 10/66 criteria and cutoff point) as well as past 1-month depression diagnoses. The diagnostic validity of the 10/66 dementia diagnosis was established by comparing this against a clinical diagnosis (sensitivity = 95.6% and specificity = 81.8%), whilst the positive predictive value was 72.9% in our sample.[13]

ii) Sociodemographic characteristics: information relating to age, gender, ethnicity, marital status, level of education and employment status was collected.

iii) Health status questionnaires which included self-reported a) global health, b) doctor diagnosis of medical illnesses, and c) current physical impairments. The older person was asked, "Have you ever been told by a doctor that you have: a) high blood pressure, b) heart problems, c) diabetes, d) stroke, or e) sudden weakness of a limb, loss of speech, or partial blindness (transient ischaemic attacks [TIAs])?" Data relating to self-reported 'current' health conditions were also collected for the following: arthritis or rheumatism; eyesight problems; hearing difficulties or deafness; persistent cough; breathlessness, difficulty in breathing or asthma; stomach or intestine problems; fainting or blackouts; paralysis, weakness, or loss of one leg or arm; skin disorders; and cancer. Blood pressure readings were taken as part of a physical and neurological examination and they were used in this analysis instead of self-reported hypertension.

The interviewer administered a series of open-ended questions to the informant in order to ascertain caregiver dependence from his/her perspective. Examples of questions include: "Who shares the home with the respondent?"; "What kind of help does the respondent need inside of the home and outside of the home?"; "Who, in the family, is available to care for the respondent?"; "What help do you provide?"; "Do you help to organise care and support for the respondent?"; "Is there anyone else in the family who is more involved in helping than you?"; and "What about friends and neighbours?"

Based on the responses provided by the informant, the interviewer then coded whether the respondent needed care "much of the time", "occasionally" or "not at all". This coding was based on the interviewer's perception of the need for care, independent of whether this was routinely met. Caregiver dependence was classified as needing care either "occasionally" or "much of the time", while those that indicated that the older respondent did not need care at all were classified as independent.

Both the older person and the informant were administered the respective questionnaires, via a face-to-face interview, which took place at the respondent's residence or another preferred location. Administration of the questionnaires was either in English, Chinese, Malay, Tamil or in one of the following dialects: Cantonese, Hokkien or Teochew. The language used was based on the preference of the person being interviewed and the interview itself took an average of 2 to 3 hours to complete.

Quality Control

Trained interviewers conducted the interviews after undergoing an intensive 3-week training. In total, 3 trainings, attended by 47 interviewers, were conducted. The training was then followed by an evaluation to certify that the interviewer was proficient to begin data collection and they were also closely monitored and supervised in the period after passing the evaluation. In addition, throughout the data collection phase, quality assurance processes were also implemented to ensure high quality data whereby a minimum of 20% of each interviewer's cases were subjected to detailed verification in order to determine any falsification of data. Regular monitoring visits were conducted throughout the duration of the study to ensure all study records including consent forms and electronic data were in order and where necessary, errors were amended. Vigorous attempts were also made to contact each respondent; interviewers were required to make up to 10 attempts (at different days and times) to reach the respondent before they could be classified as a non-responder.

Statistical Analysis

Statistical analyses were carried out using the SAS System version 9.3. All data analyses were performed using weighted data. A series of multivariate regression models were used to examine sociodemographic correlates of caregiver dependence, associations between caregiver dependence, and other health outcomes with adjustment for sociodemographic variables and other health outcomes. To account for the effects of the complex sample design due to stratification and weighting, standard errors and significance tests were estimated using the Taylor series linearisation method. Multivariate significance was evaluated using the Wald test based on design-corrected coefficient variance-covariance matrices. Statistical significance was set at the conventional level of $P < 0.05$, using two-sided tests.

Results

The sociodemographic characteristics of the respondents are shown in Table 1. The mean age of respondents was 70 years and the sample comprised 57.1% female and 42.9% male respondents, with the majority of the sample being of Chinese ethnicity (82.6%), currently married (65.4%) and retired (38.5%). The majority of informants were female (59.6%), aged between 45 to 64 years (42.1%), married (71.5%) and were the child of the older respondent (36.9%).

The prevalence of caregiver dependence (needing care occasionally or much of the time) was 17.2% (n = 693). Table 2 shows the prevalence of caregiver dependence by sociodemographic characteristics while Table 3 shows the sociodemographic correlates of caregiver dependence in this sample. Caregiver dependence was most prevalent among those who were 85 years old and above, females, of Malay ethnicity, widowed, had no formal education, or retired (Table 2). After controlling for sociodemographic variables, the odds of being caregiver-dependent were significantly higher among older age groups (75 to 84 years, and 85 years and above) (P <0.001), Malay and Indian ethnicity (P <0.001), those who had never been married (P = 0.048) and those with no education (P = 0.035), as well as homemakers and those who were retired (P <0.001) (Table 3).

Table 4 shows the prevalence rates and odds ratio of health conditions with caregiver dependence. Amongst those with caregiver dependence, the most prevalent physical conditions were hypertension (77.6%), eyesight problems (56.6%) and dementia (50.1%). After adjusting for sociodemographic variables in multiple logistic regression analyses, we found dementia (P <0.001) and depression (P <0.001) diagnoses as well as the following physical conditions: heart problems (P <0.001), stroke (P <0.001), diabetes (P = 0.004), TIAs (P = 0.007), eyesight problems (P <0.001), hearing difficulty (P = 0.04), persistent cough (P = 0.001), stomach or intestine problems (P = 0.001), paralysis (P <0.001), skin disorders (P <0.003) and cancer (P = 0.039) were significantly associated with caregiver dependence. In the final model after adjusting for all health conditions and sociodemographic characteristics, we found that dementia (P <0.001) and depression (P = 0.0113) diagnoses as well as stroke (P = 0.002), eyesight problems (P = 0.0031), persistent cough (P = 0.0158), asthma (P = 0.0161), paralysis (P <0.001), and cancer (P = 0.026) remained significantly associated with caregiver dependence.

Discussion

This study determined the prevalence and risk factors of caregiver dependence and highlighted that caregiver dependence is not uncommon among older adults in

Table 1. Sociodemographic Characteristics of the Sample (n = 2421)

Demographic Characteristic	n	Unweighted %	Weighted %
Age group			
60 – 74	1403	58	74.8
75 – 84	633	26.1	19.5
85+	385	15.9	5.7
Gender			
Men	1039	42.9	43
Women	1382	57.1	57
Ethnicity			
Chinese	931	38.5	82.6
Malay	728	30.1	9.8
Indian	728	30.1	6.1
Others	34	1.4	1.5
Marital status			
Never married	108	4.5	6.8
Married/cohabiting	1419	58.7	65.4
Widowed	798	33	22.8
Divorced/separated	94	3.9	5
Education			
None	502	20.9	17.1
Some, but did not complete primary	579	24.1	23.8
Completed primary	597	24.8	24.1
Completed secondary	488	20.3	22.5
Completed tertiary	241	10	12.5
Employment			
Paid work (part-time and full-time)	632	26.4	32.9
Unemployed (looking for work)	30	1.3	1.4
Homemaker	782	32.7	27.2
Retired	947	39.6	38.5
Informant's gender			
Women	1559	64.4	59.6
Men	861	35.6	40.4
Informant's age group			
21 – 44 years	629	26	25.7
45 – 64 years	1151	47.6	42.1
≥65 years	638	26.4	32.2
Informant's marital status			
Never married	528	21.8	23.8
Married/cohabiting	1720	71.2	71.4
Widowed	116	4.8	3.1
Divorced/separated	53	2.2	1.7
Informant's relationship to older respondent			
Spouse	883	36.5	44.1
Child	1082	44.7	36.9
Son-/daughter-in-law	147	6.1	4
Sibling	97	4	5.9
Other	211	8.7	9.1

Table 2. Caregiver Dependence Prevalence by Sociodemographic Characteristics

Demographic Characteristic	Caregiver Dependence					
	Yes			No		
	n	%	SE	n	%	SE
Age group						
60 – 74	169	8.8	1	1234	91.2	1
75 – 84	251	34.9	2.6	382	65.1	2.6
85+	273	67.8	3.2	112	32.2	3.2
Gender						
Men	212	13	1.3	827	87	1.3
Women	481	20.4	1.3	901	79.6	1.3
Ethnicity						
Chinese	230	16.1	1.1	701	83.9	1.1
Malay	250	24.9	1.6	478	75.1	1.6
Indian	208	21.5	1.4	520	78.5	1.4
Others	5	13.9	6	29	86.1	6
Marital status						
Never married	26	15.2	4.3	82	84.8	4.3
Married/cohabiting	242	11.7	1.1	1177	88.3	1.1
Widowed	408	34.9	2.3	390	65.1	2.3
Divorced/separated	15	8.2	3.3	79	91.8	3.3
Education						
None	257	35	2.9	245	65	2.9
Some, but did not complete primary	176	18.2	2	403	81.8	2
Completed primary	125	14	1.8	472	86	1.8
Completed secondary	83	9.7	1.6	405	90.3	1.6
Completed tertiary	41	10.4	2.4	200	89.6	2.4
Employment						
Paid work (part-time and full-time)	15	0.8	0.4	617	99.2	0.4
Unemployed (looking for work)	2	1.7	1.4	28	98.3	1.4
Homemaker	306	21.4	1.8	476	78.6	1.8
Retired	352	27.9	1.9	595	72.1	1.9

SE: Standard error

Singapore. More specifically, it determined specific sociodemographic correlates associated with caregiver dependence including age, ethnicity, as well as marital, educational and employment status. The study also revealed that dementia, depression, stroke, eyesight problems, persistent cough, asthma, paralysis and cancer were also significantly associated with caregiver dependence.

Findings from the study showed that 17.2% of older adults were dependent on a caregiver. Whilst previous studies have measured dependence, it is difficult to make exact comparisons due to methodological differences including differences in age ranges and population age structures, as well as the way in which dependence is defined and measured. Despite these variances however, dependence is most commonly reported to be between 12% to 20%[6,7,15-18] among older adults.

One in 6 older adults were caregiver-dependent and as the population continues to age, it is expected that dependency will also increase. At the same time, fertility rates have decreased in Singapore from a total fertility rate of 3.07 in 1970, to just 1.19 in 2013.[10] This "demographic transition" or shift from high fertility and high mortality to low fertility and low mortality means that services and infrastructure for health and social care need to be in place to not only support the dependent older adults, but also their caregivers.

In a recent study among the same sample, Vaingankar et al[9] investigated care participation, care needs and care burden among caregivers of older adults. Findings revealed that

Table 3. Sociodemographic Correlates of Caregiver Dependence

Demographic Characteristic	OR*	95% CI		*P* Value
		Lower Limit	Upper Limit	
Age group				
60 – 74	Ref.			
75 – 84	3	2.1	4.4	<0.001
85+	10	6.3	15.8	<0.001
Gender				
Men	Ref.			
Women	1.3	0.8	2.1	0.328
Ethnicity				
Chinese	Ref.			
Malay	2.2	1.6	3.1	<0.001
Indian	2.1	1.5	2.8	<0.001
Others	1.1	0.3	3.6	0.891
Marital status				
Never married	2.4	1.01	5.8	0.048
Married/cohabiting	Ref.			
Widowed	1.4	0.96	2.1	0.078
Divorced/separated	1.04	0.4	3.1	0.941
Education				
None	2.2	1.1	4.5	0.035
Some, but did not complete primary	1.2	0.6	2.4	0.667
Completed primary	1.1	0.5	2.2	0.876
Completed secondary	0.9	0.4	1.9	0.808
Completed tertiary	Ref.			
Employment				
Paid work (part-time and full-time)	Ref.			
Unemployed (looking for work)	1.6	0.2	10.9	0.645
Homemaker	14.9	5.7	38.9	<0.001
Retired	27.6	10.6	72.1	<0.001

CI: Confidence interval; OR: Odds ratio; Ref.: Reference category
*Derived from multiple logistic regression analyses.

care participation was highest in activities of communication (35.1%), feeding (32%), and bathing (21.1%) while care burden was experienced by 24.5% of caregivers and was significantly associated with dependent older adults who needed care "much of the time" (OR: 2.5 vs no care needed). Resources and support services are needed to address potential caregiver challenges, burden and strain that can arise as a result from caring for dependent older adults. Adequate and sustainable long-term care arrangements also need to be considered when planning future healthcare policies for a rapidly ageing population.

Various sociodemographic characteristics were found to be associated with caregiver dependence. Malays and Indians were more likely to be caregiver-dependent compared with Chinese. In an earlier study undertaken in Singapore which examined late-life functional disability among the elderly (aged 60 years and above), Ng and colleagues[5] reported Malays and Indians were significantly associated with disability based on the respondent's level of dependence in performing 10 ADLs. There has been substantial variance between studies investigating the extent to which sociodemographic and health factors explain ethnic differences.[19,20] It is likely that dependence has social, cultural and environmental underpinnings including learned dependency or adaptation, acceptance of the "sick role" and the attitudes toward aged care of family members.[21] Therefore, further research is needed to better understand these ethnic and cultural differences.

Those who were never married were significantly more likely to be dependent on a caregiver. These differences

Table 4. Prevalence Rates and Odds Ratio of Other Health Conditions in Dependence

Health Conditions	Prevalence Rates		Caregiver Dependence				Caregiver Dependence			
	Yes		Multiple Logistic Regression Adjusting for Sociodemographic Characteristics				Multiple Logistic Regression Adjusting for Sociodemographic Characteristics and Other Health Conditions			
			95% CI				95% CI			
	n	%	OR*	Lower Limit	Upper Limit	*P* Value	OR†	Lower Limit	Upper Limit	*P* Value
10/66 Dementia	356	50.1	27.2	15	49.4	<0.001	22.8	12.5	41.5	<0.0001
GMS-AGECAT depression cases	85	9.6	4.2	2.1	8.4	<0.001	2.7	1.3	6.0	0.0113
Hypertension	500	77.6	0.9	0.6	1.3	0.47	0.9	0.5	1.6	0.7083
Heart problems	179	22.9	2.3	1.5	3.5	<0.001	1.4	0.8	2.5	0.2568
Stroke	135	27.6	11.7	6.4	21.6	<0.001	3.9	1.9	7.9	0.0002
Diabetes	272	37.2	1.7	1.2	2.4	0.004	1.4	0.9	2.2	0.1507
TIAs	39	4.5	4.5	1.5	13.5	0.007	1.1	0.2	4.9	0.9501
Arthritis or rheumatism	264	38.7	1.2	0.9	1.8	0.211	0.9	0.6	1.4	0.6188
Eyesight problems	355	56.6	2	1.4	2.7	<0.001	2.0	1.3	3.1	0.0031
Hearing difficulty	243	31.7	1.5	1.02	2.2	0.04	1.05	0.6	1.8	0.8683
Persistent cough	60	8.4	2.7	1.5	5.1	0.001	3.3	1.3	8.7	0.0158
Asthma	89	10.3	0.99	0.6	1.7	0.987	0.4	0.2	0.8	0.0161
Stomach or intestine problems	100	17.2	2.3	1.4	3.7	0.001	1.8	0.98	3.5	0.0583
Faints or blackouts	53	10.3	1.7	0.9	3.1	0.112	2.1	0.9	5.0	0.0836
Paralysis	229	32.1	8.7	5	14.9	<0.001	6.9	3.6	13.3	<0.0001
Skin disorders	82	12.1	2.5	1.4	4.6	0.003	1.1	0.4	2.9	0.8608
Cancer	31	5.8	2.2	1.04	4.6	0.039	3.0	1.1	8.0	0.026

CI: Confidence interval; GMS-AGECAT: Geriatric Mental State-Automated Geriatric Examination for Computer Assisted Taxonomy; OR: Odds ratio; TIAs: Transient ischaemic attacks

*OR was derived from multiple logistic regression analyses after adjusting for age, gender, ethnicity, marital, education and employment status.

†OR was derived from multiple logistic regression analyses after adjusting for age, gender, ethnicity, marital, education, employment status and other health conditions.

may be attributed to the marital resource model, which shows that marriage provides social, psychological and economic resources, which in turn promote health and reduce the risk of disability.[22] Having no formal education was also associated with caregiver dependence, a finding that is consistent with previous research.[23,24] Caregiver dependence was more prevalent among homemakers and retirees. Given that these older adults were not working at the time of the survey, it is possible that their age or current health status affected their ability to work and/or caused them to be dependent on a caregiver.

People diagnosed with dementia were nearly 23 times more likely to be caregiver-dependent, where dementia was the highest predictor of caregiver dependence; this finding has similarly been reported in previous research.[3,4,6,7] Given the debilitating nature of dementia and its devastating impact on the capacity for independent living, it is not surprising that caregiver dependence is common among those with this condition. Consequently, these impacts place huge constraints on caregivers themselves as well as on social and health services. A recent meta-analysis which explored the prevalence of mental disorders among caregivers of people with Alzheimer's disease revealed that these caregivers had a higher prevalence of depression and anxiety, as compared with the general population and those caring for patients with other illnesses,[25] which may further compound existing challenges of caregiving. Future health policies need to address the associated issues of an ageing population, taking into account chronic and debilitating non-communicable diseases such as dementia.

A significant psychiatric predictor of caregiver dependence in our study was depression. Depression in the elderly is not uncommon and may be a result of social, psychological or biological influences.[26,27] Alternatively, pre-existing caregiver dependence as a result of poor physical health conditions could be associated with depression. However,

due to the cross-sectional nature of this study, we were unable to establish any temporal relationship between caregiver dependence and associated factors. Given the significant public health implications of depression among older adults, in conjunction with the associated negative consequences that include functional decline, disability, decreased quality of life, comorbid medical conditions[28,29] and an increase in healthcare utilisation associated with increased healthcare costs,[30] it is imperative that routine systems and processes are in place to regularly screen for depression in this vulnerable population.

Stroke is the leading cause of disability in Singapore.[31] However, unlike dementia, the occurrence of stroke is sudden and therefore caregiver dependence is unlikely to be gradual. This will often result in older adults needing assistance with care immediately, whilst at the same time they will be faced with both the complexities and acceptance of dependency.[32] Clinicians should be aware that individuals with recently diagnosed chronic conditions such as stroke may also need guidance or direction in managing newly acquired dependency.[4] Persistent cough was also found to be significantly associated with caregiver dependence, and to our knowledge, we are not aware of any studies that have reported this association nor the nature of the association. Thus, further exploration into this relationship is needed. Whilst little is known about over-the-counter medicine misuse or abuse among community-dwelling older adults in Singapore, studies elsewhere have shown that prescription drug abuse, including cough syrups, is on the rise.[33,34] Therefore, diligent prescription and monitoring of medications by doctors is needed.

Caregiver dependence was significantly associated with cancer. Fatigue is a common side-effect of cancer.[35] It is also one of the greatest threats to functional independence among older adults[36] and is the most frequent chronic symptom of cancer and cancer treatment. Furthermore, it is a major cause of disability for cancer survivors and their caregivers.[35,36] Given that ageing is a major risk factor for cancer, it is important that, whenever possible, independence is maintained among this population. Community-based strategies and interventions are needed to support and assist independent living among cancer survivors, which will also alleviate any unnecessary caregiver burden or stress.

The study findings should be interpreted in light of the following limitations. Firstly, caregiver dependence was ascertained using a semi-structured interview and the rating of caregiver dependence was somewhat subjective. However, as caregiver dependence was determined based on the need for care, according to the informant and not the older person, this more direct approach may have minimised under-reporting due to social desirability or cognitive impairment. There may have also been information bias, given that the interviewers' rated caregiver dependence was based on the informant's account of needs for care, which may have been influenced by knowledge of the older person's health status. Data on the inter-rater reliability of our assessment would have been valuable. Furthermore, as there is no operational definition of caregiver dependence, this lends itself to the need for further research relating to the construct which would also allow for cross-cultural comparisons to be made across studies in the future. In Singapore, 49% of households with an older adult who has some limitations in ADL employ foreign domestic workers.[38] Whilst we did not specifically gather information on whether care was provided by foreign domestic workers, 44.3% of those who were caregiver-dependent indicated that "paid help" was provided during the day and 26.4% said it was provided during the night.[9] "Paid help" refers largely to care and help provided by domestic workers in the Singapore context. Physical conditions were self-reported rather than clinician assessed or verified via medical records and therefore could be affected by various biases. Finally, the cross-sectional design of the study precludes any inferences on the causal relationship between health conditions and caregiver dependence.

The strengths of the study are the large sample size, inclusion of a representative sample of the general population, good response rate, cognitively testing the survey questionnaires prior to the survey launch, the option of completing the survey in 1 of 4 local languages or 1 of 3 dialects, and the superior quality control measures and processes that were implemented throughout the study duration.

Conclusion

The study has several important implications. We identified specific sociodemographic and health conditions that were significantly associated with caregiver dependence—older age, Malay and Indian ethnicity, being single/unmarried, having no education, being a homemaker or retired as well as dementia, depression, stroke, eyesight problems, persistent cough, asthma, paralysis and cancer. These associations should be considered when planning interventions, services and support to promote independent living among older adults, especially given that healthy ageing may postpone the onset of chronic diseases and disability in the final years of life.[7] Furthermore, given the burden associated with caring for older adults and the declining working age support ratio and fertility rates, the needs of caregivers of older adults also must be considered when planning future interventions and caregiver support programmes so that caregiving experiences may be improved.

Acknowledgement

This study was funded by the Ministry of Health, Singapore and the Singapore Millennium Foundation of the Temasek Trust.

REFERENCES

1. United Nations. World Population Ageing 2013. Available at: http://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2013.pdf. Accessed on 12 January 2016.
2. World Health Organisation. WHO Statistical Information System. Working paper describing data sources, methods and results for projections of mortality and burden of disease for 2005, 2015 and 2030. Geneva: WHO; 2006.
3. Harwood RH, Sayer AA, Hirschfeld M. Current and future worldwide prevalence of dependency, its relationship to total population, and dependency ratios. Bull World Health Organ 2004;82:251-8.
4. Wolff JL, Boult C, Boyd C, Anderson G. Newly reported chronic conditions and onset of functional dependency. J Am Geriatr Soc 2005;53:851-5.
5. Ng TP, Niti M, Chiam PC, Kua EH. Prevalence and correlates of functional disability in multiethnic elderly Singaporeans. J Am Geriatr Soc 2006;54:21-9.
6. Acosta D, Rottbeck R, Rodríguez G, Ferri CP, Prince MJ. The epidemiology of dependency among urban-dwelling older people in the Dominican Republic; a cross-sectional survey. BMC Public Health 2008;8:285.
7. Sousa RM, Ferri CP, Acosta D, Guerra M, Huang Y, Jacob K, et al. The contribution of chronic diseases to the prevalence of dependence among older people in Latin America, China and India: a 10/66 Dementia Research Group population-based survey. BMC Geriatr 2010;10:53.
8. McLaughlin T, Feldman H, Fillit H, Sano M, Schmitt F, Aisen P, et al. Dependence as a unifying construct in defining Alzheimer's disease severity. Alzheimers Dement 2010;6:482-93.
9. Vaingankar JA, Chong SA, Abdin E, Picco L, Jeyagurunathan A, Zhang Y, et al. Care participation and burden among informal caregivers of older adults with care needs and associations with dementia. Int Psychogeriatr 2016;28:221-31.
10. Department of Statistics. Population Trends 2014. Available at: https://www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/population_and_population_structure/population2014.pdf. Accessed on 12 January 2016.
11. A sustainable population for a dynamic Singapore: Population White Paper. Available at: http://www.nptd.gov.sg/portals/0/news/population-white-paper.pdf Accessed on 2 September 2016.
12. Chiam PC, Ng TP, Tan LL, Ong PS, Ang A, Kua EH. Prevalence of dementia in Singapore—results of the National Mental Health Survey of the Elderly 2003. Ann Acad Med Singapore 2004;33:S14-5.
13. Subramaniam M, Chong SA, Vaingankar JA, Abdin E, Chua BY, Chua HC, et al. Prevalence of dementia in people aged 60 years and above: results from the WiSE study. J Alzheimers Dis 2015;45:1127-38.
14. Prince M, Ferri CP, Acosta D, Albanese E, Arizaga R, Dewey M, et al. The protocols for the 10/66 dementia 598 research group population-based research programme. BMC Public Health 2007;7:165.
15. Crimmins EM, Saito Y, Reynolds SL. Further evidence on recent trends in the prevalence and incidence of disability among older Americans from 2 sources: the LSOA and NHIS. J Gerontol B Psychol Sci Soc Sci 1997;52:S59-71.
16. Manton KG, Corder L, Stallard E: Chronic disability trends in elderly United States populations: 1982-1994. Proc Natl Acad Sci U S A 1997;94:2593-8.
17. Melzer D, McWilliams B, Brayne C, Johnson T, Bond J. Profile of disability in elderly people: estimates from a longitudinal population study. BMJ 1999;318:1108-11.
18. Beland F, Zunzunegui MV. Predictors of functional status in older people living at home. Age Ageing 1999;28:153-9.
19. Hamman RF, Mulgrew CL, Baxter J, Shetterly SM, Swenson C, Morgenstern NE. Methods and prevalence of ADL limitations in Hispanic and non-Hispanic white subjects in rural Colorado: the San Luis Valley Health and Aging Study. Ann Epidemiol 1999;9:225-35.
20. Liao Y, McGee DL, Cao G, Cooper RS. Black-white differences in disability and morbidity in the last years of life. Am J Epidemiol 1999;149:1097-103.
21. Chen P, Yu ES, Zhang M, Liu WT, Hill R, Katzman R. ADL dependence and medical conditions in Chinese older persons: a population-based survey in Shanghai, China. J Am Geriatr Soc 1995;43:378-83.
22. Waite LJ, Gallagher M. The case for marriage: why married people are happier, healthier, and better off financially. Oregon: Broadway Books; 2001. p. 40-157.
23. Guralnik JM, Simonsick EM. Physical disability in older Americans. J Gerontol 1993;48:3-10.
24. Boult C, Kane RL, Louis TA, Boult L, McCaffrey D. Chronic conditions that lead to functional limitation in the elderly. J Gerontol 1994;49:M28-36.
25. Sallim AB, Sayampanathan AA, Cuttilan A, Chun-Man Ho R. Prevalence of mental health disorders among caregivers of patients with Alzheimer disease. J Am Med Dir Assoc 2015;16:1034-41.
26. Blazer DG. Depression in late life: review and commentary. J Gerontol A Biol Sci Med Sci 2003;58:249-65.
27. Blazer DG 2nd, Hybels CF. Origins of depression in later life. Psychol Med 2005;35:1241-52.
28. Fiske A, Wetherell JL, Gatz M. Depression in older adults. Annu Rev Clin Psychol 2009;5:363-89.
29. Kim JM, Shin IS, Yoon JS, Stewart R. Prevalence and correlated of late-life depression compared between urban and rural populations in Korea. Int J Geriatr Psychiatry 2002;17:409-15.
30. Luppa M, Heinrich S, Matschinger H, Sandholzer H, Angermeyer MC, König HH, et al. Direct costs associated with depression in old age in Germany. J Affect Disord 2008;105:195-204.
31. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Blaha MJ, et al. Heart disease and stroke statistics – 2014 update: a report from the American Heart Association. Circulation 2014;129:e28-292.
32. Hammarström G, Torres S. Being, feeling and acting: a qualitative study of Swedish home-help care recipients' understandings of dependence and independence. J Aging Stud 2010;24:75-87.
33. Basca B. The elderly and prescription drug misuse and abuse. Prevention Tactics 2008;9:1-7. Available at: http://www.carsrp.org/publications/Prevention%20Tactics/PT09.02.08.pdf. Accessed on 13 July 2016.
34. Culberson JW, Ticker RL, Burnett J, Marcus MT, Pickens SL, Dyer CB. Prescription medication use among self-neglecting elderly. J of Addict Nurs 2011;22:63-8.
35. Luciani A, Jacobsen PB, Extermann M, Foa P, Marussi D, Overcash JA, et al. Fatigue and functional dependence in older cancer patients. Am J Clin Oncol 2008;31:424-30.
36. Hardy SE, Studenski SA. Fatigue and function over 3 years among older adults. J Gerontol A Biol Sci Med Sci 2008;63:1389-92.
37. Ansah JP, Matchar DB, Love SR, Malhotra R, Do YK, Chan A, et al. Simulating the impact of long-term care policy on family eldercare hours. Health Serv Res 2013;48:773-91.

Original Article

Attitudes and Concerns of Diabetic Patients towards Bariatric Surgery as Treatment of Diabetes

Hui Wen Chua, [1]*MBBS (Singapore), MRCS (Ed)*, Hui Jun Zhou, [2]*MBBS, MSc, PhD*, Chin Meng Khoo, [1]*MBBS (University of Malaya), MRCP (UK), FAMS (Endocrinology)*, Asim Shabbir, [1]*MBBS (Pak), MMed (Singapore), FRCS (Edin)*, Davide Lomanto, [1]*MD (Rome), PhD (Rome), FAMS (General Surgery)*, Jimmy BY So, [1]*MBChB, FRCS, MPH*

Abstract

Introduction: Bariatric surgery is increasingly recognised as an effective treatment for type 2 diabetes that significantly improves glycaemic control, even achieving remission. This study examined perceptions and concerns of diabetic patients towards bariatric surgery as a treatment option for diabetes. Materials and Methods: A total of 150 patients were recruited from a specialised diabetic outpatient clinic and completed a questionnaire (items were rated on a Likert scale from slightly important [lowest score of 1] to extremely important [maximum score of 5]). Logistic regression was performed to identify factors influencing decision for surgery. Results: The 74 males and 76 females had mean age of 50 (range 20 to 78) and body mass index (BMI) of 29.6 kg/m^2 (range 18.1 to 51); 61% considered surgery favourably. Predictive factors for interest in surgery: higher educational levels (OR = 2.3; 95% CI, 1.2 to 4.4), duration of diabetes (OR = 0.4; 95% CI, 0.2 to 1.0) and use of insulin (OR = 2.1; 95% CI, 1.1 to 4.1). Reasons for surgery: desire for remission (Likert scale 4.7 ± 0.7), to prevent complications (Likert scale 4.5 ± 0.9) and to reduce medications (Likert scale 4.3 ± 1.1). For those not keen on surgery, main reasons were fear of surgery (Likert scale 4 ± 1.5) and satisfaction with current therapy (Likert scale 3.7 ± 1.6). Conclusion: Many diabetic patients would consider surgery as an option to improve their metabolic disorder (greater interest in patients with higher educational levels, currently using insulin and with shorter duration of diabetes). Surgical complications, length of recovery and duration of benefits were the main concerns.

Ann Acad Med Singapore 2016;45:495-506

Key words: Metabolic surgery, Patient perception, Remission

Introduction

The world is currently facing an epidemic of type 2 diabetes mellitus and obesity.[1] Type 2 diabetes is one of the fastest growing diseases with nearly 366 million people affected worldwide and 450 million people are forecasted to have diabetes by 2030.[2] Current standard therapy includes oral hypoglycaemic agents and insulin, with varied success. Diabetes is known to be a chronic progressive disease, which may unfortunately lead to end organ dysfunction or failure, despite oral hypoglycaemic agents, insulin or even an intensified combination.[3] There has been great interest and excitement regarding bariatric surgery such as gastric bypass and sleeve gastrectomy, as another line of treatment for type 2 diabetes. The National Institute for Health and Care Excellence (NICE) guidelines in the United Kingdom for bariatric surgery are for patients who have tried all appropriate non-surgical measures but are unable to achieve clinically beneficial weight loss. These patients include those with body mass index (BMI) greater than 40 kg/m^2 (37.5 kg/m^2 in Asians); or BMI of between 35 and 40 kg/m^2 (32.5 to 37.5 kg/m^2 in Asians) together with significant disease that could be improved. There should also be expedited assessment for bariatric surgery to those with BMI of above 35 kg/m^2 (32.5 kg/m^2 in Asians) with recent onset type 2 diabetes. Those for consideration of surgery are patients with BMI of 30 to 34.9 kg/m^2 with

[1]Department of Surgery, National University Health System, Singapore
[2]Saw Swee Hock School of Public Health, National University of Singapore, Singapore
Address for Correspondence: A/Prof Jimmy So, Department of General Surgery, University Surgical Cluster, National University Health System, Singapore, Level 8, NUHS Tower Block, 1E Kent Ridge Road, Singapore 119228.
Email: jimmy_so@nuhs.edu.sg

recent onset type 2 diabetes (27.5 to 32.5 kg/m^2 in Asians).

Bariatric surgery has achieved diabetes remission in up to 75% to 95% of patients, and significant improvements in glycaemic control, together with hypertension and hyperlipidaemia over medical therapy among morbidly obese patients.[4,5] These results, whilst slightly lower, are also seen in patients with BMI of <35 kg/m^2.[6] International Diabetes Federation issued a position statement in 2011 that recommended bariatric surgery to be "considered earlier in the treatment of eligible patients to help stem serious complications that can result from diabetes", calling it an effective, safe and cost-effective therapy. Hence, the term "metabolic surgery" is commonly used.

The clinical benefits of bariatric surgery versus medical therapy has, however, only been conclusively proven in diabetic patients who are obese as defined by a BMI of 27 to 43 (Schauer, NEJM 2012) in a Western population, and in practice, is mainly indicated for patients with BMI of 35. The benefits, safety and cost-effectiveness of bariatric surgery in non-obese diabetics remain controversial in the absence of definitive clinical data.

This study was conducted with a view to examine the perceptions diabetic patients have towards bariatric or metabolic surgery and to find out about their concerns.

Materials and Methods

Approval for this research was sought from the Institutional Review Board of National University Health System, Singapore.

Participants

From 1 January 2013 to 30 April 2013, 150 patients who were on a follow-up at a specialised diabetic clinic in a tertiary centre in Singapore were interviewed without looking at their clinical charts or history. The first 15 patients in the clinic were approached and consented for interview, for 10 consecutive days. Informed consent was sought. Participants were first given an information sheet about diabetes and current metabolic surgeries (laparoscopic gastric bypass and sleeve gastrectomy), and their associated risks and benefits (Appendix 1). They then independently completed the questionnaire in the presence of an interviewer (Appendix 2). The interviewer is a resident in the department, whose role is to answer any questions the patients might have regarding the questionnaire and to ensure that all sections are answered.

Questionnaire

The questionnaire was in English, but the interviewer was available to explain the content in Mandarin to those who required that. The first section aimed to ascertain demographic factors of participants, the duration of diabetes and current therapy they were on. Information on the impression of their diabetes control and latest glycated haemoglobin (HbA1c) levels were also included. The next section asked if participants had heard of bariatric surgery before, and whether they would be interested in it. The last section with factors for and against surgery was listed for participants to rank in order of importance, based on a 5-level Likert scale from "Slightly important" to "Extremely important". All participants, regardless of interest in surgery, were asked to rank factors that they would consider for an elective surgery. They also had to write down the minimum duration that they would like to reap the benefits from any elective surgery. The first draft of the questionnaire was pilot tested with 10 participants from the same clinic.

An accompanying patient information sheet (Appendix 1) describes the scientific background and states that bariatric surgery has shown utility in obese patients with diabetes but does not define the BMI that defines obesity in this context.

Statistical Analysis

The characteristics of the sample were presented by descriptive statistics. The relationship between the individual factors and interest in surgery were first evaluated by univariate logistic regression. With backward elimination process, multivariate logistic regression was conducted to identify the significant factors for predicting interest in surgery. T-test was used to explore the reasons why patients were keen for surgery. All analyses were performed using IBM Statistical Product and Service Solutions (SPSS) version 19.

Results

Characteristics of the participants are shown in Table 1. The mean age of participants was 49.7 (20 to 78) years and mean BMI was 29.6 (18.1 to 51) kg/m^2. Almost an equal number of males and females were polled.

Twenty-two (14.7%) participants had heard of bariatric surgery prior to the survey, and 92 (61.3%) participants were keen to consider surgery as treatment of diabetes. Table 2 illustrates the important reasons for surgery, which included desire for remission, to prevent complications and to reduce medications; 61.3% (n = 50) of those keen for surgery selected gastric bypass as the preferred option, and the rest, 38.7% (n = 42) selected sleeve gastrectomy. For the 58 patients who were not keen on surgery, the reasons were fear of surgery and satisfaction with current therapy (Table 2).

Table 1. Demographics of Sample

	n	%
Age (years)*	49.7 (20 – 78)	
Gender		
Male	74	49.3
Female	76	50.7
Education		
Below diploma	88	58.7
Diploma and higher	62	41.3
BMI (kg/m^2)*	29.6 (18.1 – 51)	
Duration of diabetes (years)		
<10	113	75.3
≥10	37	24.7
Current treatment		
Lifestyle changes only	5	0.3
OHGAs only	60	40
Insulin analogues only	45	30
Both OHGAs and insulin	40	26.7
Perception of diabetes control		
Satisfactory	120	80
Unsatisfactory	30	20
Latest HbA1c levels		
<7%	33	22
7.1% – 9.9%	68	45.3
≥10%	49	32.7
Microvascular complications		
None	71	47.3
1 organ	39	26
>1 organ	40	26.7
Macrovascular complications		
None	124	82.7
1 organ	21	14
>1 organ	5	3.3
Heard of surgery for diabetes		
Yes	22	14.7
No	128	85.3
Keen to consider surgery		
Yes	92	61.3
No	58	38.7

BMI: Body mass index; HbA1c: Glycated haemoglobin; OHGA: Oral hypoglycaemic agents
*Values are mean (range).

Table 2. Factors Influencing Decision for Surgery

Decision for Surgery	Mean (Likert Scale)
A) Keen for surgery (n = 92)	
Hope to prevent complications	4.5 ± 0.9
Hope for diabetes remission	4.7 ± 0.7
Keen to stop/reduce medications	4.3 ± 1.1
High cost of current therapy	2.3 ± 1.3
Having many complications now	1.8 ± 1.3
Recommendations from doctor	2.5 ± 1.4
B) Not keen for surgery (n = 58)	
Fear of surgery	4.0 ± 1.5
Satisfied with current therapy	3.7 ± 1.6
Cost of surgery	2.1 ± 1.1
Unconvinced of efficacy of surgery	1.7 ± 1.1

Table 3. Factors for Consideration of Surgery (n = 150)

	Mean (Likert Scale)	*P* Value
Risk of surgery		
Keen for surgery (n = 92)	4.5 ± 0.9	0.855
Not keen for surgery (n = 58)	4.4 ± 1.2	
Length of recovery		
Keen for surgery (n = 92)	2.4 ± 1.3	0.022
Not keen for surgery (n = 58)	3.0 ± 1.6	
Minimum duration of purported benefits of surgery		
Keen for surgery (n = 92)	6.1 (years) ± 2.3	<0.001
Not keen for surgery (n = 58)	8.7 (years) ± 2.2	
Cost of surgery		
Keen for surgery (n = 92)	2.6 ± 1.4	0.292
Not keen for surgery (n = 58)	2.4 ±1.3	

Comparing the 2 groups of patients, those not keen for surgery were more worried about length of recovery (P = 0.022) and wanted a longer duration of benefits than those who were keen (P <0.001) (Table 3). Those who were keen for surgery wanted a mean of 6.1 years for benefits of surgery to last, whilst those who were not keen wanted 8.7 years.

By univariate analysis, groups that were more likely to be interested in surgery included: male gender, those with education levels (diploma and higher), respondents who feel they have poor glycaemic control, those having HbA1c >10% and those who have heard of metabolic surgery before. Respondents with longer duration of diabetes and suffering from macrovascular complications were less likely to be interested (Table 4).

Table 4. Factors to Predict for Interest in Surgery (Non-Adjusted)

	Odds Ratio	95% CI	*P* Value
Age	1.0	(0.95, 1.0)	0.03
Gender			
Female compared to male	0.5	(0.3, 1.0)	0.06
Education			
Diploma and higher compared to below diploma	3.0	(1.5, 6.1)	0.003
BMI	1.0	(0.99, 1.1)	0.135
Duration of diabetes	0.4	(0.2, 0.9)	0.029
Current therapy of diabetes			
OHGA only	1.6	(0.4, 1.6)	0.543
Insulin only	0.8	(0.8, 3.0)	0.192
Perception of diabetic control			
Unsatisfactory compared to satisfactory	2.4	(1.0, 6.1)	0.059
Latest HbA1c levels			
<7% (reference)	1.0		0.114
7% – 9.9%	1.6	(0.7, 3.7)	0.263
≥10%	2.7	(1.1, 6.7)	0.038
Presence of macrovascular complications	0.5	(0.2, 1.1)	0.084
Microvascular complications			
None (reference)	1.0		0.41
1 organ	1.0	(0.4, 2.2)	0.943
>1 organ	0.6	(0.3, 1.3)	0.205
Heard of surgery			
Yes compared to no	4.5	(1.5, 13.3)	0.007

BMI: Body mass index; CI: Confidence interval; HbA1c: Glycated haemoglobin; OHGA: Oral hypoglycaemic agents

Table 5. Independent Predictors for Interest in Surgery

	Odds Ratio	95% CI	*P* Value
Education	2.3	(1.2, 4.4)	0.012
Diploma and higher compared to below diploma			
Use of insulin	2.1	(1.1, 4.1)	0.03
Duration of diabetes	0.4	(0.2, 1.0)	0.043

CI: confidence interval

By multivariate analysis, educational levels (diploma and higher), usage of insulin and shorter duration of diabetes were independent predictors of interest in surgery (Table 5).

Discussion

To our knowledge, this is the first study of its kind undertaken in Singapore to systematically examine the perceptions of diabetic patients towards surgery as an alternative treatment of diabetes. Our study showed that although only a minority of diabetic patients had heard about surgical options for diabetes, over 60% of them were keen in surgery after brief descriptions were given. They hoped for remission of disease, prevention of complications and reduction in medications. Independent predictors of interest in surgery include higher education levels, usage of insulin and shorter duration of diabetes.

There is increasing interest in surgical treatment for type 2 diabetes due to the success of bariatric surgery. Bariatric procedures are becoming more commonplace; an estimated 350,000 bariatric procedures were performed globally in 2008 compared to fewer than 5000 procedures in the 1980s.[7] Now, 90% of procedures are performed laparoscopically, with Roux-en-Y gastric bypass, sleeve gastrectomy and adjustable gastric banding, amongst the most performed. Mortality for such surgery is also acceptable at 0.3%.[8] Bariatric surgery not only treats obesity, but also reduces cardiovascular risk factors and deaths,[9] by treating all components of metabolic syndrome including type 2 diabetes mellitus. Several randomised controlled trials have also shown positive results of bariatric surgery achieving remission in up to 75% to 95% of patients or a significant improvement in glycaemic control, hypertension and hyperlipidaemia over medical therapy among obese patients.[4-6] In a recently published paper from the Swedish Obese Subjects study, both short- and long-term results have been extremely encouraging and exciting. Surgery achieved not only remission rates of 72.3% at 2 years follow-up (compared to 16.4 % in the control group), the remission rates at 15 years was 30.4% versus 6.5% in the control group.[10] Similarly, microvascular and macrovascular complications were much reduced in patients in the surgery group.

In this survey, patients who attained diploma or tertiary educational levels were more interested in surgery. It is likely that those with higher educational levels have a better understanding of metabolic surgery and awareness of the complications from diabetes mellitus, thus making them more inclined to be interested in considering surgery. Those who are currently on insulin therapy were also more interested to undergo metabolic surgery for remission of the disease and to stop the use of insulin.[11] The effectiveness of diabetic therapy is dependent on compliance of usage, and studies have shown that many patients are poor compliers with treatment, including oral medications and insulin. This is especially so for insulin injections, where there are many steps to learn, starting from storage to injection of insulin, and learning about coping with hypoglycaemia.[12]

Many have developed phobia for insulin injections, with resultant reduced compliance rates.[13] These reasons may explain why those on insulin therapy are keen for metabolic surgery. Those with shorter duration of diabetes might be more interested in surgery as they are still relatively healthy. Diabetes is a chronic medical condition and the longer the duration of diabetes, the more likely patients have complications. As such, patients are keen to find a way to retard progression of diabetes, prevent complications and even cause remission. Recently, a study looking at patients who underwent laparoscopic gastric bypass found that those with shorter duration of diabetes (less than 5 years) and the mildest form on diet control had the highest rates of remission, suggesting that surgical intervention early on increases likelihood of remission of diabetes.[14] Other authors have also shown better results and benefits of surgical intervention in patients with early-stage diabetes, suggesting earlier surgical intervention in overweight patients (BMI of <30) with early-stage diabetes may be advocated.[15]

Amongst all respondents, risk of surgery was a major concern. Even with a laparoscopic approach, surgery is still an invasive treatment. Bariatric surgeons need to maintain the safety of these procedures and strategies such as accreditation, multidisciplinary approach and clinical pathways which are essential for quality assurance of such surgery.[16,17] It has been reported that perceived risks of metabolic surgery are overestimated, not only amongst the general public, but also healthcare professionals, including family physicians.[18] Currently, the overall mortality risk of metabolic surgery is estimated to be below 0.5%.[19] Introduction of the idea of metabolic surgery alongside accurate estimates of its risks and benefits can be put in place.

Many patients yearn for remission of diabetes, to reduce medications, attain better control and reduce complications and are open to the idea of surgery as another arm of therapy. Other physicians could be informed about the concept of metabolic surgery. As it is now with obesity surgery, referrals are low although primary care physicians and subspecialists like cardiologists and endocrinologists see a high proportion of obese patients who could benefit from surgery. Despite having a perception of high surgical effectiveness, the referrals for surgery are relatively low because many are still unfamiliar with morbid obesity management and surgical referral guidelines.[20]

There are limitations in our study. The study has only sampled a select population of diabetic patients in a specialised clinic in a tertiary hospital, in the public healthcare system in Singapore. These patients who require specialist care for diabetes may have more labile glycaemic controls than the majority who are seen in primary care settings and are able to attain stable glycaemic control. To improve generalisability, the same study can be done on a wider population in the primary care setting. Whilst a lot of encouraging results showing the benefits of surgery compared to medical therapy have been shown in randomised controlled trials,[4,5] long-term results from randomised controlled trials are still lacking. Respondents have also expressed a wish for the effects of surgery to be long lasting. High quality comparative studies with long-term results are highly desirable to establish standards.

Conclusion

Our study shows that the majority of diabetic patients are keen to consider surgery. They hope to achieve remission of diabetes, reduce the usage of medications and to prevent complications. However, the main concern is risk of surgery. Adequate training and a multidisciplinary approach will help to improve the quality of surgical treatment. Increasing the awareness of the public, primary care physicians and other diabetic specialists regarding metabolic surgery will give realistic expectations of the benefits and risks of surgery. It is exciting to know that in the future, surgery could be part of the armamentarium for diabetes therapy that can be readily acceptable by patients, driving the advancement of treatment for diabetes.

REFERENCES

1. Chen L, Magliano DJ, Zimmet PZ. The worldwide epidemiology of type 2 diabetes mellitus-present and future perspectives. Nat Rev Endocrinol 2011;8:228-36.
2. International Diabetes Federation position statement 2011. Available at: http://www.idf.org/publications/idf-position-statement-bariatric-surgery. Accessed on 18 October 2016.
3. Dixon JB, Zimmet P, Alberti KG, Rubino F. International Diabetes Federation Taskforce on Epidemiology and Prevention Bariatric surgery: an IDF statement for obese Type 2 diabetes. Diabet Med 2011;28:628-42.
4. Mingrone G, Rubino F, Panunzi S, Ghirlanda G, Gaetano AD, Castagneto M, et al. Bariatric surgery versus conventional medical therapy for type 2 diabetes. N Engl J Med 2012;366:1577-85.
5. Carlsson LM, Sjostrom L, Peltonen M, Svensson PA, Ahlin S, Wedel H, et al.Bariatric surgery and prevention of type 2 diabetes in Swedish obese subjects. N Engl J Med 2012;367:695-704.
6. Lee WJ, Wang W, Lee YC, Huang MT, Ser KH, Chen JC, et al. Effect of laparoscopic mini-gastric bypass for type 2 diabetes mellitus: comparison of BMI >35 and <35 kg/m^2. J Gastrointest Surg 2008;12:945-52.
7. Samuel I, Mason EE, Renquist KE, Huang YH, Zimmerman MB, Jamal Ml. Bariatric surgery trends: an 18-year report from the International Bariatric Surgery Registry. Am J Surg 2006;192:657-62.
8. Longitudinal Assessment of Bariatric Surgery (LABS) Consortium, Flum DR, Belle SH, King WC, Wahed AS, Berk P, et al. Perioperative safety in the longitudinal assessment of bariatric surgery. N Engl J Med 2009;361:445-54.

9. Sjostrom L, Carlsson LM, Peltonen M, Svensson PA, Jacobson P, Olbers T. Bariatric surgery and long-term cardiovascular events. JAMA 2012;307:56-65.
10. Sjostrom L, Carlsson LM, Peltonen M, Sjoholm K, Jacobson P, Svensson PA, et al. Association of bariatric surgery with long-term remission of type 2 diabetes and with microvascular and macrovascular complications. JAMA 2014;311:2297-304.
11. Cramer JA. A systematic review of adherence with medications for diabetes. Diabetes Care 2004;27:1218-24.
12. Zambanini A, Newson RB, Maisey M, Feher MD. Injection related anxiety in insulin-treated diabetes. Diabetes Res Clin Pract 1999;46:239-46.
13. Cramer JA, Pugh MJ. The influence of insulin use on glycemic control: how well do adults follow prescriptions for insulin? Diabetes Care 2005;28:78-83.
14. Schauer PR, Kelley D, Burquera B, Kuller L, Ikramuddin S, Rao RH, et al. Effect of laparoscopic Roux-en Y gastric bypass on type 2 diabetes mellitus. Ann Surg 2003;238:467-85.
15. Arterburn DE, O'Connnor PJ. A look ahead at the future of diabetes prevention and treatment. JAMA 2012;308:2517-8.
16. Maher JW, Hawver ML, Pucci A, Wolfe LG, Meador JG, Kellum JM. Four hundred fifty consecutive laparoscopic Roux-en-Y gastric bypasses with no mortality and declining leak rates and lengths of stay in a bariatric training program. J Am Coll Surg 2008;206:940-4;discussion 944-5.
17. Lemanu DP, Srinivasa S, Singh PP, Johannsen S, MacCormick AD, Hill AG. Optimizing perioperative care in bariatric surgery patients. Obes Surg 2012;22:979-90.
18. Afonso BB, Rosenthal R, Li KM, Zapatier J, Szomstein S. Perceived barriers to bariatric surgery among morbidly obese patients. Surg Obes Relat Dis 2010;6:16-21.
19. Schroeder R, Garrison JM Jr, Johnson MS. Treatment of adult obesity with bariatric surgery. Am Fam Physician 2011;84:805-14.
20. Avidor Y, Still CD, Brunner M, Buchwald JN, Buchwalk H. Primary care and subspecialty management of morbid obesity: referral patterns for bariatric surgery. Surg Obes Relat Dis 2007;3:392-407.

Appendix 1
Information Sheet for Patient's Attitudes and Perception towards Diabetic Surgery

Q1) What is Diabetes?

Diabetes is long-term condition with high blood sugar levels because the body cannot use the sugar properly. It happens when the pancreas is not producing enough hormones (insulin) that utilizes the blood sugar, or the insulin produced does not work properly.

Q2) What can diabetes do to your body?

a. Short term – Sugar levels that rise very high can cause dangerous chemical changes in the bloodstream, or even coma.
b. Long-term – affect multiple organs causing blindness, heart attacks, strokes, kidney failure requiring dialysis, numbness in hands and feet, non-healing leg ulcers and even amputations.

Q3) How do we treat diabetes?

a. Lifestyle changes such as controlling diet and regular exercise,
b. Oral medications
c. Insulin injections.

The aim is to bring the sugar level down to an optimal level to prevent complications.

Q4) What is new?

In recent years, evidence has suggested that surgeries (2 are listed and explained below) have worked well in obese patients with diabetes with overall 70% diabetes remission[i].

Q5) Are these operations dangerous?

The overall risk of such operations varies from 3-16%, with significant complications like bleeding, leaks and long-term nutritional issues.

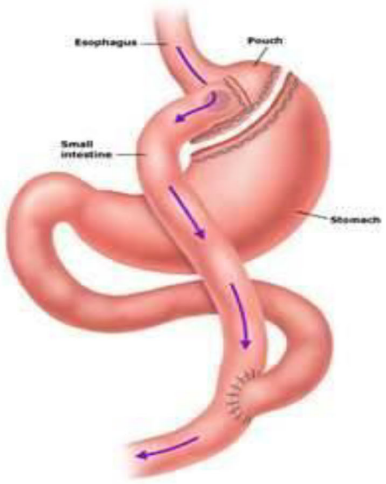
Q6) Why is surgery better than medical therapy?

- Better and sustained weight loss
- Reduction of sugar levels to within normal limits, increasing likelihood of being able to stop or reduce diabetes medications
- Better blood pressure control and reduced lipid levels.

Q7) What surgeries are available?

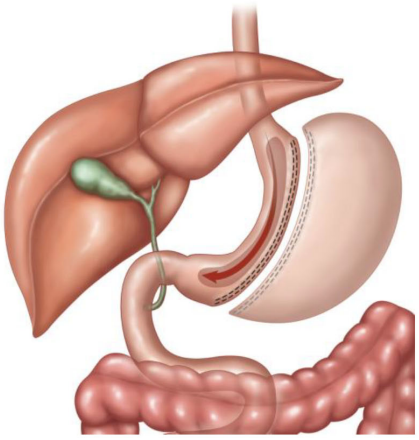
A) Gastric bypass

1. Creating a small pouch from the upper stomach, bypassing the remaining stomach, to restrict the volume of food that can be eaten.
2. Joining the stomach pouch to the lower part of the small intestine to reduce food absorption.



B) Sleeve gastrectomy:

The stomach is restricted to 25% of its size by cutting and simultaneously stapling using a surgical device to form a tube-like structure, with no bypassing of intestines. The part of the stomach producing "hunger" hormones is cut off, so the patient will feel full easily.



Advantages: Both procedures are one-off; producing rapid weight loss, reduce hunger pangs, with up to 80% of people gaining improvement or resolution of hypertension and diabetes. [ii]

Disadvantages:

	Gastric Bypass	**Sleeve Gastrectomy**
Procedure	Technically challenging	Technically simple
Operative time	2-4h	1-1.5h
Complications	Early: Bleeding from wounds, leaks along staple line Late: Internal hernias, stomach ulcers, narrowing of stomach outlet	Early: bleeding from wounds, leaks along staple line Late: risk of reflux disease
Others	Need for life-long vitamins	

*Estimated cost for the surgery (excluding hospital stay and ward charges) for a typical B2 class patient: S$1250, claimable from Medisave (subject to means testing).

[i] Lee WJ, Chong K, Ser KH, Lee YC, Chen SC, Chen JC, Tsai MH, Chuang LM. Gastric bypass vs sleeve gastrectomy for type 2 diabetes mellitus: a randomized controlled trial. Arch Surg. 2011 Feb;146(2):143-8.

[ii] Sarkhosh K, Birch DW, Shi X, Gill RS, Karmali S. The impact of sleeve gastrectomy on hypertension: a systematic review. Obes Surg. 2012 May;22(5):832-7.

Fischer L, Hildebrandt C, Bruckner T, Kenngott H, Linke GR, Gehrig T, Büchler MW, Müller-Stich BP. Excessive weight loss after sleeve gastrectomy: a systematic review. Obes Surg. 2012 May;22(5):721-31.

Appendix 2
Questionnaire of Patient's Perceptions and Attitudes towards Diabetic Surgery

1) Age: _____

2) Gender:
Female ☐
Male ☐

3) Highest education qualifications:
Primary School ☐
GCSE 'O' Levels ☐
GCSE 'A' Levels ☐
Diploma ☐
University ☐
Postgraduate or higher ☐

4) Height= _____ Weight= _____ BMI: _____

5) Years diagnosed with diabetes: _____

6) Current medical therapy of diabetes:
Lifestyle changes (diet control and exercise) Yes/No
Oral medications Yes/No
Insulin Yes/No

7) A) Your impression of your diabetic control over the last one year (or from diagnosis till now):
Good ☐
Acceptable ☐
Poor ☐
B) Latest HbA1c: _____

8) What medical problems do you have from diabetes?
a) Eye disease (requiring laser treatment) ☐
b) Kidney problems ☐
c) Numbness in hands and feet ☐
d) Vessel disease in legs ☐
e) Heart disease ☐
f) Stroke ☐

9) Have you previously heard of surgery to cure/reduce diabetes?
Yes ☐
No ☐

10) Now that you know of the surgeries available, would you be keen to undergo surgery to cure diabetes/improve control and stop/reduce medications
Yes, please go onto Q11)
No, please go onto Q12)

11) If you answered yes, how important are these factors in helping you decide to undergo surgery ?

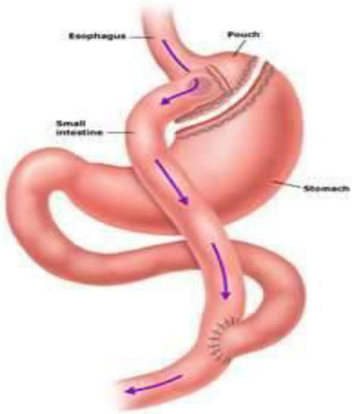
	Slightly important	Moderately important	Important	Very important	Extremely important
a) You are unable to control your diabetes well with medications.	1	2	3	4	5
b) You have many complications now (eye, vessel, kidney disease, stroke, heart attack)	1	2	3	4	5
c) You hope to prevent complications from diabetes.	1	2	3	4	5
d) You hope for a cure for diabetes.	1	2	3	4	5
e) You are keen to stop/ reduce medications.	1	2	3	4	5
f) High costs of medications	1	2	3	4	5
g) Recommendations from doctor taking care of your diabetes	1	2	3	4	5
h) Others: (Please specify)	_____				

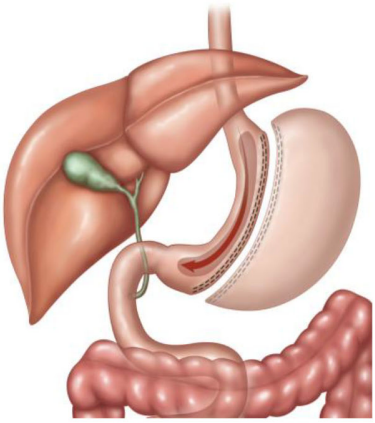
12) If you answered no, how important are these factors in helping you decide not to go for surgery ?

	Slightly important	Moderately important	Important	Very important	Extremely important
a) You are satisfied with current medical treatment of diabetes.	1	2	3	4	5
b) You are afraid of complications/side effects from surgery.	1	2	3	4	5
c) Cost of surgery	1	2	3	4	5
d) You are unconvinced about the effectiveness of surgery to treat diabetes.	1	2	3	4	5
e) Others: (Please specify)	_____				

13) If you could choose the surgery, which one would you prefer?

Gastric bypass ☐ Sleeve gastrectomy ☐





14) If your doctor has recommended you for an elective surgery, how important are these factors in helping you decide whether or not to proceed?

	Slightly important	Moderately important	Important	Very important	Extremely important
a) Whether the surgery has a high risk of complications	1	2	3	4	5
b) The estimated length of recovery	1	2	3	4	5
c) Cost of surgery and hospitalization	1	2	3	4	5
d) Others: (Please specify)	_____				

15) If your doctor has recommended you for this diabetic surgery, what is the minimum duration you would like for the reported benefits?

_____ **(months/years)**

Original Article

Sleep Patterns and Dysfunctions in Children with Learning Problems

Ramkumar Aishworiya, [1]*MRCPCH, MMed (Paediatrics)*, Po Fun Chan, [2]*MRCP, MMed (Internal Medicine)*, Jennifer SH Kiing, [1]*FRACP, FAMS,* Shang Chee Chong, [1]*MRCPCH, MMed (Paediatrics)*, Stacey KH Tay, [1]*MRCPCH, MMed (Paediatrics)*

Abstract

Introduction: This study aimed to determine the sleep patterns and dysfunctions in children with learning problems in comparison against a local population-based sample. Materials and Methods: Parents of 200 children with learning problems and 372 parents of a local population-based sample of typically developing (TD) children were recruited to complete a questionnaire on their child's sleep patterns and sleep problems. The Children's Sleep Habits Questionnaire (CSHQ) is a validated parent-reported sleep screening questionnaire that contains 54 items identifying sleep behaviours in children. Results: The mean age of the sample was 4.2 years (SD: 1.4; range, 2 to 6 years). Sleep duration was similar between the 2 groups. The difference in mean CSHQ subscale scores between children with learning problems and TD children was significant for sleep-disordered breathing (1.3 vs 1.2, *P* = 0.001). Among children with learning problems, 36.5% snored (vs 26.6% of TD children), 30.5% had noisy breathing (vs 18.8%), and 9.0% (vs 4.6%) experienced difficulty breathing 2 or more times a week. Children with learning problems woke up in a more irritable mood (*P* = 0.01), had more difficulty in getting out of bed (*P* <0.001), and took a longer time to be alert (*P* <0.001). They exhibited fewer behaviours of daytime drowsiness (*P* = 0.009). Among this group of children, 15.0% of parents reported that their child had a sleep problem compared to 9.0% in the TD group. Conclusion: Sleep breathing disorders and symptoms of morning sleepiness are more prevalent in children with learning problems. Symptoms of daytime lethargy are similar between the 2 groups. We suggest that a simple outpatient screening targeted at these problems be instituted in the initial workup of any child with learning difficulties.

Ann Acad Med Singapore 2016;45:507-12

Key words: Behavioural problems, Learning Disabilities, Singapore, Sleep duration

Introduction

Sleep problems in preschool children are common and they are even more prevalent and persistent in children with learning disabilities. In addition to causing both child and parent significant distress at bedtime and during the night, [1,2] sleep problems also compound daytime functional difficulties and even play a role in the development of daytime behavioural problems.[3]

Approximately 25% of typically developing (TD) preschool children have sleep problems pertaining to bedtime resistance, sleep onset delays and night awakenings.[4-7] Prevalence rates for sleep problems in children with developmental disorders vary from 13% to 86%[8] and are significantly higher than those found in TD children.[9]

Sleep problems have also been clearly shown to influence neurobehavioural outcomes. Consequently, recognising and treating conditions such as mild sleep-disordered breathing have been shown to improve learning and academic outcomes.[10] Effective treatment of sleep problems has also resulted in the alleviation of many neurobehavioural problems.[11] In addition, abbreviated sleep durations and other sleep problems have been associated with externalising symptoms and attention deficit hyperactivity disorder (ADHD) in children.[12]

[1]Department of Paediatrics, Khoo Teck Puat-National University Children's Medical Institute, National University Health Systems, Singapore
[2]Division of Medicine, National University Health Systems, Singapore
Address for Correspondence: Dr Aishworiya Ramkumar, Department of Paediatrics, Khoo Teck Puat-National University Children's Medical Institute, National University Health Systems, 1E Kent Ridge Road, NUHS Tower Block Level 12, Singapore 119228.
Email: aishworiya_ramkumar@nuhs.edu.sg

Despite the well established association between sleep problems and neurobehavioural outcomes, sleep disorders have not been comprehensively evaluated in Singaporean children with learning disabilities. Of note, it has been shown that Singaporean preschool children have a significantly shorter sleep duration compared with Caucasian populations.[13] Hence, it is likely that the same may be seen in Singaporean children with learning disabilities.

The aim of this study was to compare the sleep patterns and dysfunctions of Singaporean children with learning difficulties against a local population-based sample of TD children.

Materials and Methods

Study Population

Eligible children were those who were between 2 to 7 years old and residing in Singapore. A total of 372 TD children were enrolled from 27 childcare centres countrywide and 200 children with a range of learning and behavioural problems were consecutively recruited from the Child Development Unit (CDU), National University Hospital (NUH), Singapore. Those patients who had learning and behavioural problems had been diagnosed clinically and/or through psychological assessment with a variety of learning problems such as specific learning disorders that included dyslexia, specific language impairment and learning disorder in written expression. Among the TD children, 950 questionnaires were given out at the childcare centres and 372 usable questionnaires were returned (a response rate of 40%). The questionnaire included a question on the presence of any diagnosed learning disability or sleep disorder. Children with a history of any form of learning problem were excluded from the TD group and those with any previously diagnosed sleep disorder were excluded from both the TD and learning problems group.

Materials and Methods

The questionnaire survey used in this study was based on the Children's Sleep Habits Questionnaire (CSHQ), a validated parent-report sleep screening questionnaire that contained 54 items identifying sleep behaviours in children. Parents were instructed to tick the relevant answers to the questions or write brief statements.

The first part of the survey contained questions regarding the child's demographics, including age, gender and race. The second part evaluated the quantity and quality of sleep. Thirty-three sleep-disturbance items were grouped into 8 subscales: bedtime resistance, sleep-onset delay, sleep duration, sleep anxiety, night waking, parasomnias, sleep-disordered breathing and daytime sleepiness. Parents were asked to state the frequency of these disorders and behaviours by checking a 3-level frequency scale ranging from daily to less than once a week. Parents also had to list their perception regarding the presence of a sleep problem, rate its severity and state the treatment sought.

Questionnaires were given to families of TD children through the administrators/teachers of 27 childcare centres and kindergartens. Children with learning problems were recruited by doctors in the study team during their consultation at the CDU.

Ethics approval for the study was obtained from the National Healthcare Group Domain Specific Research Board, Singapore.

Data Analysis

This was a cross-sectional study with data accrued from parental reports. All analyses were carried out using Statistical Package for Social Sciences (SPSS) for Windows Version 16.0. Comparisons of categorical variables were statistically evaluated using a likelihood ratio chi-square test and continuous variables were assessed using one-way analysis of variance (ANOVA). All statistical significance was set at $P < 0.05$. P values were calculated using the independent samples t-test.

Results

Demographics

The mean age of children included in the analyses (n = 572) was 4.2 years (SD: 1.4). Children with learning problems were significantly older compared with TD children (4.5 years vs 4.1 years, $P = 0.002$). There was also significantly more males represented in the group with learning problems (75.6% vs 50.5%, $P < 0.0001$) (Table 1).

Table 1. Demographic Data of Study Subjects

Characteristic	Typically Developing Children		Children with Learning Problems	
Subgroup	**n**	**% of Total Sample***	**n**	**% of Total Sample***
Age (years)				
2	45	12.1	21	11.6
3	70	18.8	23	12.7
4	83	22.3	53	29.3
5	78	21.0	35	19.3
6	50	13.4	30	16.6
7	0	0	18	9.9
Gender				
Female	170	45.7	47	22.9
Male	188	50.5	155	75.6

*Note: Numbers may not add up to total due to sporadic missing data. Percentages may not total 100 because of rounding.

Table 2. Sleep Duration in Study Subjects

	Typically Developing Children		Children with Learning Problems		*P* Values
	Mean	SD	Mean	SD	
Bedtime, h	9.48 pm	02.35	9.08 pm	04.07	0.05
Rise time, h	7.25 am	00.38	7.46 am	01.49	0.01
Night awakenings duration, minutes	8	23.7	17	42.1	0.02
Night sleep duration, hours	8.53	00.56	9.04	01.11	0.79
Nap duration, hours	1.58	00.03	1.47	00.05	0.07

SD: Standard deviation

Sleep Quantity

Mean sleep duration per night was 9 hours and 4 minutes in children with learning problems. No significant difference in night sleep and nap durations were found between the TD and learning problems groups, although children in the latter group rose later and slept earlier. Children with learning problems also displayed a longer duration of night awakenings (Table 2).

Sleep Quality

Sleep resistance was the most prevalent problem in both groups of children, followed by sleep-wake transition problems, night awakenings, sleep dysfunctions and sleep-disordered breathing. At least 50% of children with learning problems had specific sleep problems that occurred 2 or more times a week; these included delaying of bedtime (learning problems 58.5% vs TD 56.7 %, $P = 0.912$), requirement of bedtime routines (learning problems 53.5% vs TD 52.5 %, $P = 0.678$) and fear of sleeping alone (learning problems 50.0% vs TD 37.4 %, $P = 0.347$). These problems were also highly prevalent in the TD group and there was no significant difference in sleep resistance problems between the 2 groups. The domain scores for parasomnias were also comparable between the 2 groups and not statistically significant. The results were not different when gender and age specific analysis were carried out between both groups.

Sleep-Disordered Breathing

The primary symptom of sleep-disordered breathing in preschool children was snoring, occurring in 30% of all children surveyed. Of note, 26.6% of TD children and 36.5% of children with learning problems snored at least twice a week ($P = 0.012$). Apart from snoring, 30.5% of children with learning problems had noisy breathing (TD 18.8%) and 9.0% (TD 4.6%) experienced difficulty in breathing 2 or more times a week. Children with learning problems scored higher than TD children in all symptoms of sleep-disordered breathing (Table 3) and exhibited more frequent and severe sleep-disordered breathing problems. The mean domain score was thus higher in children with learning problems as compared to that of TD children (1.21 vs 1.05, $P < 0.001$). Further analysis by gender showed that among males, there was still a statistically significant difference in the overall score for sleep-disordered breathing between the TD and the learning problems groups (mean, 1.26 and 1.10; $P < 0.001$). This was not the case among females.

Clinically obvious sleep apnoea was observed to be rarely encountered and was found only in 6 of the 572 cases surveyed.

Table 3. Sleep Quality Measures in Study Subjects

	Typically Developing Children		Children with Learning Problems		*P* Values
	Mean	SD	Mean	SD	
Bedtime resistance and anxiety	1.79	0.43	1.79	0.42	0.874
Night waking and sleep duration	1.33	0.41	1.38	0.49	0.294
Parasomnia	1.16	0.31	1.19	0.37	0.328
Sleep-disordered breathing	1.05	0.40	1.21	0.44	<0.001
Snores	1.24	0.64	1.48	0.74	<0.001
Breathes noisily	1.12	0.58	1.36	0.69	<0.001
Breathes with difficulty	0.95	0.38	1.06	0.49	0.007
Stops breathing	0.89	0.36	0.94	0.33	0.102

SD: Standard deviation

Morning and Daytime Behaviour

In children, morning and daytime behaviour could be a reflection of the child's function and alertness during the day, which in turn may be impacted by the quality of sleep the child has. Hence, this is one of the subscales in the CHSQ. Overall, symptoms of morning sleepiness were more frequent in the group with learning problems and this difference was statistically significant (P <0.001). Self-waking was more common in children with learning problems, even though the mean wake time was 20 minutes later than that of TD children (P <0.001). Children with learning problems woke up in a more irritable mood (P <0.011), had more difficulty getting out of bed (P <0.001), and took a longer time to be alert (P <0.001). However, children with learning problems exhibited fewer behaviours of daytime sleepiness compared to TD children (P = 0.009). Children with learning problems were less likely to fall asleep while watching television or when riding in a vehicle compared to TD children (P = 0.033 and P = 0.0012, respectively) (Table 4). These results did not differ when gender and age specific analysis were carried out between the 2 groups.

Parental Perception

Parental perception was assessed with regards to the presence of sleep problems as well as the degree of sleep deprivation in the child. Fifteen percent (n = 30) of children with learning problems were observed by their parents to have significantly more sleep problems compared to 9% of TD children (n = 33, P <0.001). However, they were not perceived to be more sleep-deprived by their parents (learning problems 21% vs TD 16%, P = 0.157).

Discussion

Similar to previously published studies in other paediatric populations, this study confirmed that Singaporean children with learning problems had more sleep problems than TD children. These sleep problems were specifically in the areas of sleep-disordered breathing and daytime sleepiness. Problems in other domains such as sleep resistance also occurred more frequently in children with learning problems, although this difference was not statistically significant. Of note, sleep duration was similar between the 2 groups.

The increased prevalence of sleep problems in the learning problems group was supported by the fact that 15% of parents in this group reported that their child had a sleep problem, compared to the 9% in TD children. Yet, given that these children did not have a shorter sleep duration, this finding suggests that in this local population, parents may have observed sleep difficulties other than absolute deficits in sleep quantity. Sleep quality, symptoms of sleep-disordered breathing, and poor morning and daytime behaviours may also have contributed to a parent's perception of a sleep problem.

Among the study subjects in general, there was a wide range of frequent sleep disturbances spanning more than 10 items on the questionnaire. Among the children with learning problems, 81.5% of them had at least 1 frequent sleep problem (co-sleeping was excluded as a sleep problem as it is culturally acceptable in our local context). This finding is in the upper range of reported rates of sleep problems in children with developmental problems (44% to 86%).[14-20] However, direct comparison of the frequency of sleep disorders across studies is difficult as different instruments have been used to ascertain data.

Table 4. Morning and Daytime Behaviour in Study Subjects

	Typically Developing Children		Children with Learning Problems		*P* Values
	Mean	SD	Mean	SD	
Morning sleepiness	1.70	0.54	1.29	0.30	<0.001
Awakened by others in the morning	2.06	0.79	1.67	0.73	<0.001
Wakes up in a bad mood	1.46	0.63	1.57	0.72	0.011
Has difficulty getting out of bed	1.60	0.71	1.89	0.79	<0.001
Takes a long time to be alert	1.10	0.31	1.48	0.66	<0.001
Daytime sleepiness	1.36	0.37	1.27	0.38	0.009
Seems tired during the day	1.51	0.64	1.49	0.66	0.705
Falls asleep watching television	1.65	0.91	1.21	0.47	0.033
Falls asleep riding in a vehicle	1.82	0.90	1.51	0.86	0.012

SD: Standard deviation

Apart from the increased occurrence of sleep-disordered breathing symptoms, CSHQ subscale scores and severity ratings were similar in both groups of children in the other areas and did not reveal any significant difference. Looking at the higher scores for sleep-disordered breathing among children with learning problems, further analysis seemed to suggest that this occurred primarily among males. However, we note that the number of females among the subjects may be inadequate to detect a statistically significant difference as the study was not planned for subgroup analysis by gender. Of note, snoring was more common in children with learning problems although this symptom was not validated by further polysomnography as this was a questionnaire-based study. Nonetheless, this is noteworthy and important to assess in patients with learning problems, especially as mild forms of sleep-disordered breathing is likely to be detrimental to a child's daytime cognitive, emotional and behavioural well-being.[21] Younger children with this problem have been observed to be hyperactive and emotionally labile, while older ones may have trouble paying attention and completing tasks.[22] Early treatment of sleep-disordered breathing during years of rapid brain development may enable children to fulfill their academic and psychosocial potential.

Despite suffering from more serious sleep disturbances such as sleep-disordered breathing, children with learning problems did not exhibit the lethargy expected of the sleep-deprived. Instead, they appeared more active in the day and less prone to falling asleep when riding in vehicles or watching television as compared with the TD sample. However, they did have more symptoms of morning sleepiness, were observed to have woken up in a worse mood, had greater difficulty in getting out of bed, and took a longer time to be alert as compared with TD children. This suggests that younger children tend to present with emotional lability and hyperactivity when sleep-deprived, with irritability best observed upon waking. The morning behaviour of a young child is therefore likely to be a better indicator of his quality of sleep. Parental perception based on a child's active nature during the day may thus cause an underestimation of the true prevalence of sleep disorders in children with learning problems.

In view of the likely higher prevalence of sleep-disordered breathing in children with learning problems and the potential reversibility, an efficacious screening tool is necessary for use in clinical visits. Screening should additionally pick up symptoms of morning sleepiness that appears to be a consistent symptom in these children. Current screening algorithms such as BEARS (B = Bedtime issues, E = Excessive daytime sleepiness, A = Night awakenings, R = Regularity and duration of sleep, S = Snoring) Questionnaire focus mainly on bedtime problems, awakenings and daytime sleepiness, which do not figure strongly in the local learning disabled population. In contrast, the questions in the sleep-disordered breathing subscale of the CSHQ specifically screen for disordered breathing in sleep and morning drowsiness. It is thus more discriminating in picking up real problems in our population.

Based on this, we suggest that simple outpatient screening that consist of the following questions be instituted in the initial workup of any child with learning difficulties:

- Does your child wake up in a bad mood?
- Does your child have difficulty getting out of bed?
- Does your child take a long time to become alert?
- Does your child snore?
- Does your child breathe noisily during sleep? (E.g. snorts and grunts)
- Does your child experience difficulty in breathing during sleep?

Further studies and explanations are required to evaluate and differentiate harmless sleep problems. Many of the disturbances encountered in children with learning problems were also equally prevalent in TD children, and may cause no adverse effect on the development of a child. Certain parasomnias may be distressing to the parent but leaves no lasting impact. Further analysis of the various sleep disturbances will thus allow medical professionals to safely offer reassurance to help distressed parents cope when encountering a sleep disorder in a developmentally-delayed child. Moreover, this being an observational study, we can only show an associative link between learning problems and sleep problems; a causative link in either direction cannot be conclusively shown. Future studies can be designed to specifically see if the presence of learning problems gives rise to sleep problems or vice versa. In addition, a limitation of our study is that we do not have data reflecting the socioeconomic background of the study participants. Given that the family's socioeconomic status and home setting are potential factors that may impact sleep in general, these would be important to take into consideration in future studies. Lastly, use of objective measures of sleep quality and sleep problems such as actigraphy and formal sleep studies (polysomnography) in those patients who report on their history of sleep problems will help to further verify and quantify the presence of sleep dysfunction in these patients.

Conclusion

Sleep-disordered breathing problems are likely more common in children with learning problems. Morning sleepiness and behavioural problems associated with waking are also more prevalent in these children although daytime lethargy is similar to that in TD children. We recommend that

all children with learning difficulties be actively screened for sleep problems using the suggested outpatient screening questions during every consultation.

Acknowledgement

The authors would like to thank all the principals and teachers of childcare centres in Singapore who had rendered their assisstance in the distribution and collection of questionnaires. The authors would also like to thank Ms Chen Zhaojin from the Department of Community, Occupational and Family Medicine, National University of Singapore, for her assistance in statistical analysis.

REFERENCES

1. Doo S, Wing YK. Sleep problems of children with pervasive developmental disorders: correlation with parental stress. Dev Med Child Neurol 2006;48:650-5.
2. Polimeni MA, Richdale AL, Francis AJ. A survey of sleep problems in autism, Asperger's disorder and typically developing children. J Intellect Disabil Res 2005;49:260-8.
3. Sheldon SH. Insomnia in children. Curr Treat Options Neurol 2001;3:37-50.
4. Armstrong KL, Quinn RA, Dadds MR. The sleep patterns of normal children. Med J Aust 1994;161:202-6.
5. Jenkins S, Owen C, Bax M, Hart H. Continuities of common behavior problems in preschool children. J Child Psychol Psychiatry 1984;25:75-89.
6. Johnson CM. Infant and toddler sleep: a telephone survey of parents in one community. J Dev Behav Pediatr 1991;12:108-14.
7. Scher A, Tirosh E, Jaffe M, Rubin L, Sadeh A, Lavie P. Sleep patterns of infants and young children in Israel. Int J Behav Dev 1995;18:701-11.
8. Didden R, Sigafoos J. A review of the nature and treatment of sleep disorders in individuals with developmental disabilities. Res Dev Disabilities 2001;22:255-72.
9. Richdale A, Gavidia-Payne S, Francis A, Cotton S. Stress, behavior, and sleep problems in children with an intellectual disability. J Intellect Dev Disabil 2000;25:147-61.
10. Gozal D, O'Brien L, Row BW. Consequences of snoring and sleep disordered breathing in children. Pediatr Pulmonol Suppl 2004;26:166-8.
11. Chervin RD, Ruzicka DL, Giordani BJ, Weatherly RA, Dillon JE, Hodges EK, et al. Sleep-disordered breathing, behavior, and cognition in children before and after adenotonsillectomy. Pediatrics 2006;117: e769-78.
12. Golan N, Shahar E, Ravid S, Pillar G. Sleep disorders and daytime sleepiness in children with attention-deficit/hyperactive disorder. Sleep 2004;27:261-6.
13. Aishworiya R, Chan PF, Kiing J, Chong SC, Laino AG, Tay SKH. Sleep behaviour in a sample of preschool children in Singapore. Ann Acad Med Singapore 2012;41:99-104.
14. Cotton S, Richdale A. Brief report: parental descriptions of sleep problems in children with autism, Down syndrome, and Prader-Willi syndrome. Res Dev Disabil 2006;27:151-1.
15. Couturier JL, Speechley KN, Steele M, Normal R, Stringer B, Nicolson R. Parental perception of sleep problems in children of normal intelligence with pervasive developmental disorders: prevalence, severity, and pattern. J Am Acad Child Adolesc Psychiatry 2005;44:815-22.
16. Gail Williams P, Sears LL, Allard A. Sleep problems in children with autism. J Sleep Res 2004;13:265-8.
17. Hering E, Epstein R, Elroy S, Iancu DR, Zelnik N. Sleep patterns in autistic children. J Autism Dev Disord 1999;29:143-7.
18. Liu X, Hubbard JA, Fabes RA, Adam JB. Sleep disturbances and correlates of children with autism spectrum disorders. Child Psychiatry Hum Dev 2006;37:179-91.
19. Richdale AL, Prior MR. The sleep/wake rhythm in children with autism. Eur Child Adolesc Psychiatry 1995;4:175-86.
20. Wiggs L, Stores G. Sleep patterns and sleep disorders in children with autistic spectrum disorders: insights using parent report and actigraphy. Dev Med Child Neurol 2004;46:372-80.
21. Owens JA, Mehlenbeck R, Lee J, King MM. Effect of weight, sleep duration, and comorbid sleep disorders on behavioral outcomes in children with sleep-disordered breathing. Arch Pediatr Adolesc Med 2008;162:313-21.
22. Lamberg L. Sleep-disordered breathing may spur behavioral, learning problems in children. JAMA 2007;297:2681-3.

Drainless Parotidectomies versus Conventional Parotidectomies: Randomised Control Study on Efficacy and Safety

Dear Editor,

The use of fibrin sealant for parotid surgery without drains has been described as having cost saving benefits and obviating drain-related morbidities.[1] It is known that the use of fibrin sealant in parotid surgery decreases drain output significantly, therefore allowing parotidectomies to be done with fibrin sealants but without drains.[2,3] Until now, there has been no randomised case control study that examined the efficacy and safety of drainless parotidectomies performed with fibrin sealant and pressure bandage. This study aimed to evaluate the safety and efficacy of this technique.

Materials and Methods

This study was approved by an institutional review board. This was a prospective randomised case control study of 70 patients who had undergone a partial superficial parotidectomy performed by 1 surgeon at the Singapore General Hospital (SGH) from September 2007 to November 2011. Eligible patients were above the age of 18 years and had presented with a parotid mass that required partial superficial parotidectomies. The patients were randomised into 2 groups, A and B, using a computer-generated block randomisation. Group A consisted of 35 patients who had fibrin sealant sprayed on the parotid bed intraoperatively with the application of a pressure bandage postoperatively for 12 hours without surgical drains. Group B consisted of 35 patients who had conventional surgery with surgical drains without using fibrin glue or pressure bandage.

Patients who underwent total parotidectomies were excluded as it was not feasible to utilise a drainless parotidectomy technique with pressure bandage. This technique requires postoperative compression on the wound which may result in the facial nerve being compressed.

Surgical Technique

A standard modified Blair or a modified facelift incision was used and the partial superficial parotidectomy was done in the usual manner after a superficial musculoaponeurotic system-platysmal flap was raised. One millimetre (mL) of Tisseel® solvent containing clotting factors was mixed with 1 mL of human thrombin at a concentration of 4 IU/mL. The 2 mL reconstituted Tisseel® sealant, which takes 60 to 90 seconds to set, was then sprayed evenly on the parotid bed and the undersurface of the flap using a Tissomat spray device. This was sufficient to cover an area of up to 100 cm^2 which included the whole parotid bed. Manual compression on the parotid area was done for 5 minutes to allow the Tisseel® sealant to set adequately. The skin was then closed in the usual manner.

A parotid pressure bandage akin to a mastoid dressing for otological procedures was used for 12 hours postoperatively (Fig. 1). All patients were admitted postoperatively for 1 day. Both groups of patients were then encouraged to be discharged on postoperative day 1. The surgical drain used for all patients in Group B was a size 12 French Redivac drain. If they chose to be admitted, their surgical drains can be removed when the output is less than 30 mL from the second postoperative day onwards.

Results

The mean age of our patients was 50.8 years. Forty-one patients were female and 29 were male; 86% were Chinese (the majority race in Singapore), 6% Malay and 8% of other ethnicities. Between the 2 groups of patients, there was no statistically significant difference in terms of their biodata, comorbidities, histology of tumour and volume

Fig. 1. Parotid pressure bandage.

of parotid gland resected. Group A had an average of 50.4 cm^3 of parotid gland tissue resected whilst Group B had an average of 52.3 cm^3 of parotid gland tissue resected. Not surprisingly, the commonest histology was pleomorphic adenoma followed by Warthin's tumour (Table 1).

The mean duration of hospitalisation for Group B was 2.8 days compared to 1.1 day of stay for patients in Group A; this was statistically different (P <0.001). In Group A, 2 out of 35 patients had requested to stay for an additional day in the hospital due to postoperative nausea. The remaining 33 patients were all discharged on postoperative day 1. In Group B, despite the offer of discharging the patient on postoperative day 1 with drains, most patients preferred to stay until drain removal which was typically on postoperative day 3 when the drain output was less than 30 mL. In terms of hospitalisation costs, hospital charges per day start at USD$244 excluding medications, which could be variable. Based on the cost of Tisseel® sealant at USD$219 per mL and surgical drains which cost USD$65, the cost savings are:

Hospitalisation stay (Group A: 2.8 days - Group B: 1.1 days) x $244 - Cost of 1 mL fibrin sealant and drain ($219 - $65) = USD$260/patient.

For postoperative complications, facial nerve neuropraxia was commonest. All facial nerve palsies were temporary and all patients recovered to full facial nerve function within the next 6 months. There was no statistically significant differences between Groups A and B in terms of postoperative complications (Table 2). The rate of sialocele was not higher in Group A (8.6%) as compared to Group B (11.4%) which might be expected when performing superficial parotidectomies without surgical drains.

Discussion

This is the first prospective, randomised, case control study that evaluated the safety and efficacy of performing superficial parotidectomies with fibrin sealant and parotid pressure bandage without the use of surgical drains. The other studies published were either prospective cohort study or a retrospective study, which could potentially introduce selection bias.[1,4] We have shown significant cost savings of at least USD$260 per patient, after taking into account hospitalisation costs per day, costs of surgical drains and fibrin sealant, but without taking into account medications and other consumables that are variable among patients. Patients also enjoy a shorter hospitalisation stay when using this drainless method and the hospital benefits from an improvement in the bed situation. Our hospital had a total of 105 superficial parotidectomies performed in 2011 across all departments and this could potentially translate to cost savings of 105 x USD$260 = USD$27,300 in 1 hospital alone per year.

Along with the lower costs and shorter hospitalisation stay, the postoperative complication rate was comparable between the 2 groups with no statistically significant difference. The main worry of sialocele when used to perform superficial parotidectomies without surgical drain was nullified since having a surgical drain does not exclude the possibility of a sialocele. In fact, the rate of sialocele was slightly higher with surgical drains in Group B (11.4%) compared

Table 1. Histology of Tumours

Histology	n
Group A	35
Pleomorphic adenoma	16
Warthin's tumour	8
Acinic cell carcinoma	4
Oncocytoma	2
Basal cell adenoma	2
Mucoepidermoid carcinoma	1
Lymphoma	1
Metastatic nasopharyngeal carcinoma	1
Group B	35
Pleomorphic adenoma	14
Warthin's tumour	8
Acinic cell carcinoma	5
Oncocytoma	3
Mucoepidermoid carcinoma	3
Benign lymphoepithelial cyst	1
Cavernous hemangioma	1

Table 2. Postoperative Complications

Complications (Episodes)	% of Patients
Group A	
Facial nerve palsy	40%
Sialocele	8.6%
Skin numbness	5.7%
Frey's syndrome	2.9%
Total	20
Group B	
Facial nerve palsy	31.4%
Sialocele	11.4%
Drain site infection	5.7%
Skin numbness	5.7%
Frey's syndrome	2.9%
Stitch granuloma	2.9%
Total	21

with Group A (8.6%) even though this was not statistically significant. The fibrin sealant has been shown in other studies to decrease drain output and this could potentially result in less sialocele.[2,5]

Interestingly, 2 patients within Group B had a drain site infection that was treated successfully with oral antibiotics and 1 patient had a stitch granuloma from the silk suture used to anchor the surgical drain. These are drain-specific morbidities that will not happen in patients who have undergone drainless parotidectomies.

Conclusion

Our study is the first prospective, randomised, case control study that compared safety and efficacy of partial superficial parotidectomies with fibrin sealants and pressure bandage to conventional surgery and drains. It is shown that it is cheaper to perform partial superficial parotidectomies with fibrin sealant and a pressure bandage with comparable safety. This group of patients had lower hospitalisation costs, shorter duration of stay and no increase in morbidities. This has changed our practice in our institution and most parotid surgeries are now being performed with this technique.

REFERENCES

1. Conboy P, Brown DH. Use of tissue sealant for day surgery parotidectomy. J Otolaryngol Head Neck Surg 2008;37:208-11.
2. Patel MJ, Garg R, Rice DH. Benefits of fibrin sealants in parotidectomy: is underflap suction drainage necessary? Laryngoscope 2006;116:1708-9.
3. Maharaj M, Diamond C, Williams D, Seikaly H, Harris J. Tisseel to reduce postparotidectomy wound drainage: randomized, prospective, controlled trial. J Otolaryngol 2006;35:36-9.
4. Depondt J, Koka VN, Nasser T, Portier F, Guedon C, Barry B, et al. Use of fibrin glue in parotidectomy closure. Laryngoscope 1996;106:784-7.
5. Witt RL. The incidence and management of siaolocele after parotidectomy. Otolaryngol Head Neck Surg 2009;140:871-4.

Dennis YK Chua, [1]*MBBS (Singapore), MRCS (Edinburgh), FAMS (Singapore)*,
Christopher HK Goh, [2]*MBBS (Singapore), FRCS (Edinburgh), FAMS (Singapore)*

[1]Department of Otolaryngology, Head and Neck Surgery, Tan Tock Seng Hospital, Singapore
[2]Department of Otolaryngology, Head and Neck Surgery, Singapore General Hospital, Singapore

Address for Correspondence: Dr Dennis Chua Yu Kim, Department of Otolaryngology (ENT), Annex 1, Level 5, 11 Jalan Tan Tock Seng, Singapore 308433.
Email: dennis.chua.yk@gmail.com

A Retrospective Cohort Study of Epidemiology and Clinical Outcome in Lichen Planus

Dear Editor,

Lichen planus (LP) is a chronic inflammatory, papulosquamous disease. A previous Singapore study reported that LP is more common in ethnic Indians.[1] Other studies have reported that LP may be associated with metabolic syndrome-related diseases, such as hyperlipidaemia[2,3] and diabetes mellitus.[4,5]

LP in Asians has not been well characterised, especially in Singapore which has a multiracial population. This retrospective cohort study aimed to assess the descriptive epidemiology of LP in Singapore, such as ethnicities, comorbidities, types of LP, and sites of involvement and its general outcome. This study also aimed to evaluate any associating factors with the disease outcome. This would be useful for the management of LP.

Materials and Methods

Study Population

All cases diagnosed as LP at a tertiary outpatient dermatology clinic between January 2004 and December 2010 were retrieved from electronic medical records (EMRs) using the International Classification of Diseases, 9th revision, (ICD-9) code 697.0. Cases were either diagnosed clinically only or based on both clinical and histological confirmation. Information such as demographic data of involvement, modes of treatment, comorbidities (diabetes mellitus, dyslipidaemia) were analysed as covariates and potential confounders. Diagnosis of diabetes mellitus and dyslipidaemia were identified by either self-reported history or documented medications specific for each condition. The time interval from date of diagnosis to the date of first physician-reported clinical improvement during follow-up was noted for each patient to account for the varying follow-up duration. Patients were followed up every 2 to 4 months.

Statistical Analysis

Hazard ratio (HR), 95% HR confidence interval (CI), and *P* values were calculated to test the null hypotheses of the association between the various variables and clinical improvement during follow-up. A multivariate Cox proportional hazard regression with rate of improved outcome as the dependent variable was performed. The Statistical Package for Social Sciences (IBM SPSS Verson 22) was utilised to perform the analysis. A two-sided *P* value of <0.05 was considered statistically significant. The study was approved by our Institutional Review Board (IRB).

Results

Demographic Profile of Study Population

There were 814 patients diagnosed with LP between January 2004 and December 2010, with a mean age of 47.1 years and slight male predominance (52.9%). Indians were overrepresented (52.1%) in the study population, compared to Chinese (29.5%) and Malays (4.2%). Table 1 shows the ethnic composition of our study population and all new patients attending for skin diseases at the clinic.

Table 1. Demographics Characteristics of Our Study Population

Ethnic Group n (%)	Patients with Lichen Planus (n = 814)	New Patients Attending for Skin Diseases† (n = 385,492)	Singapore Population‡ (n = 3,771,700)	*P* Value
Chinese	240 (29.5)	295,909 (76.8)	2,794,000 (74.1)	<0.001† <0.001‡
Malay	34 (4.2)	22,133 (5.7)	503,900 (13.4)	0.055† <0.001‡
Indian	424 (52.1)	33,008 (8.6)	348,100 (9.2)	<0.001† <0.001‡
Others*	114 (14.3)	34,441 (8.9)	125,800 (3.3)	<0.001† <0.001‡

*Refers to other minority ethnic groups.
†Dermatology clinic returns from 2004 to 2010.
‡According to the Singapore Population Census 2010.

Diagnosis and Clinical Features of Lichen Planus

LP was diagnosed by clinical features alone in 445 (54.7%) patients, and by both clinical as well as histological confirmation in 369 (45.3%) patients. LP involving only the skin affected 471 (65.9%) of the patients.

The most common morphologic variant was LP vulgaris (85.1%). The most common mode of treatment was topical steroids (82.2%), comprising 0.1% of betamethasone valerate cream/ointment or clobetasol cream/ointment for cutaneous LP and either triamcinolone oral paste or clobetasol ointment for oral LP. Table 2 shows the clinical features and treatment modalities.

Treatment Outcome

More than half of the patients (55%) demonstrated an improved outcome on follow-up. Table 3 shows the results of different variables and corresponding rates of improved outcome. The rate of improved outcome for the younger (≤50 years old) population was 1.29 times that of the older (>50 years old) population ($P = 0.007$; 95% CI, 1.07 to 1.56). Those with diabetes or hyperlipidaemia had a lower rate of improved outcome compared to those with no comorbidities (HR = 0.562; $P < 0.001$). In contrast, the rates of improved outcome did not differ significantly between the different ethnic groups, sites of improvement and treatment options.

A multivariate analysis with a Cox regression model was performed to ascertain the effects of age, gender, ethnic groups, types of LP, presence of diabetes mellitus and/or hyperlipidaemia, and treatment options on the rate of improved outcome. The Cox regression model was statistically significant (χ^2 (8) = 25.4, $P = 0.001$). The presence of diabetes mellitus and/or hyperlipidaemia was associated with a lower rate of improved outcome compared to those without diabetes mellitus and hyperlipidaemia (HR = 0.603; 95% CI, 0.443 to 0.820; $P < 0.001$). Multivariate analysis did not reveal any statistically significant relationship between age groups, ethnic groups, types of LP (cutaneous LP vs oral LP), treatment options and the rate of an improved outcome.

Table 2. Clinical Features of LP

Characteristics	Patients with LP n (%)
Sites of involvement	714
Skin only	471 (65.9)
Skin and nails	17 (2.4)
Skin and oral mucous membrane	63 (8.8)
Oral mucous membrane	134 (18.8)
Genital mucous membrane	29 (4.1)
Types of LP	415
LP vulgaris	353 (85.1)
LP hypertrophicus	17 (4.1)
LP atrophicus	5 (1.2)
LP planopilaris	18 (4.4)
LP pigmentosus	12 (2.9)
Annular LP	1 (0.2)
Linear LP	5 (1.2)
LP pemphigoides	2 (0.5)
Bullous LP	1 (0.2)
Actinic LP	1 (0.2)
Treatment options*	
Topical steroids	669 (82.2)
Systemic steroids	118 (14.6)
Intralesional steroids	27 (3.3)
Topical calcineurin inhibitors	75 (9.3)
Systemic retinoids	6 (0.7)
Phototherapy	21 (2.6)

LP: Lichen planus
*Patients were allowed to have more than 1 response.

Discussion

In our study, more than half (52.2%) of the study population were ethnic Indians. There was an overrepresentation of Indians, considering the ethnic distribution of all new clinic attendees in the same time frame and that of the Singapore population in 2010. Based on the 2010 Singapore population census[6] (Table 1), Indians made up only 9.2% of the Singapore population. This result was comparable to a local study in 1988, in which Indians consisted of 69% of the study population.[1] To date, there is no genetic, developmental, or environmental explanation that explicates Indians' predisposition to LP.

Atefi et al[4] found that the duration of LP in patients with diabetes mellitus was significantly longer than those without such condition. Other studies[2,3] have reported that hyperlipidaemia was associated with an increased prevalence of LP, in addition to affecting its clinical outcome.

In our study, we observed that diabetes mellitus and/or hyperlipidaemia were associated with a significantly lower rate of improved outcome. It has been postulated that the inflammatory nature of the metabolic syndrome conditions have a role in the pathogenesis of LP, a Th1 dominant disease similar to psoriasis.[3] The pathologic glucose levels in diabetes mellitus not only inhibits the proliferation of keratinocytes and fibroblasts, but also causes apoptosis of endothelial cells and decreases vasodilation by blocking nitric oxide synthesis.[7] Moreover, advanced glycation end products activates NF-κB signalling pathway, resulting in the release of proinflammatory cytokines and increased

Table 3. Univariate and Multivariate Analysis of Variables and Rate of Improved Outcome

Variables	HR	95% CI	*P* Value	Adjusted HR	95% CI	*P* Value
Age						
≤50 years	1.29	(1.07, 1.56)	0.007	0.894	(0.724, 1.10)	0.295
>50 years	1.00					
Gender						
Male	1.21	(1.01, 1.46)	0.045	1.23	(1.01, 1.49)	0.430
Female	1.00					
Race			0.335			0.565
Chinese	1.00			1.00		
Malay	1.26	(0.776, 2.04)	0.353	1.08	(0.643,1.81)	
Indian	0.988	(0.802, 1.22)	0.906	0.926	(0.732, 1.17)	
Others	1.26	(0.918, 1.73)	0.152	1.14	(0.818, 1.60)	
Comorbidities						
Diabetes and/or hyperlipidaemia	0.562	(0.423, 0.746)	<0.001	0.603	(0.443, 0.820)	0.001
No comorbidities	1.00					
Sites of involvement						
Mucosal surface involved	0.966	(0.797, 1.17)	0.725	0.932	(0.756, 1.15)	0.513
Mucosal surface not involved	1.00					
Treatment						
Systemic treatment	0.889	(0.692, 1.14)	0.889	0.861	(0.668, 1.11)	0.245
Topical treatments	1.00					

CI: Confidence interval; HR: Hazard ratio

intracellular oxidative stress.[8] This increased oxidative stress may play a role in delaying clinical improvement in LP patients with concurrent metabolic-related syndromes such as hyperlipidaemia and diabetes mellitus.[9,10]

Strengths and Limitations

This was a large study with more than 800 cases of mucocutaneous LP. The multiethnic study population meant that an analysis of the disease could be carried out on diverse ethnic groups. The main limitation of this study was its retrospective nature. In addition, clinical improvement was mainly a physician-reported outcome and it was not standardised with a scoring system in terms of area of involvement, severity, or a patient-reported quality of life index. The time to first clinical improvement of the patient was noted and analysed in the study to account for the varying follow-up duration. However, we could not eliminate bias from interval censoring and this study lacked data regarding frequency of relapse. Information on the severity of diabetes mellitus, hyperlipidaemia and presence of other metabolic syndrome parameters, such as hypertension and increased waist circumference, were not available in our records. Prospective cohort studies should be conducted to assess the relationships between metabolic syndrome and the clinical course of LP.

Conclusion

LP affects a disproportionate number of Indians in Singapore. Patients with concomitant diabetes mellitus and/or hyperlipidaemia experienced a lower rate of improved outcome. Age groups, ethnic groups, sites of involvement and treatment options did not significantly affect the rate of improved outcome.

REFERENCES

1. Vijayasingam SM, Lim KB, Yeoh KH, Cheong WL, Chong YY, Daniel M, et al. Lichen planus: a study of 72 cases in Singapore. Ann Acad Med Singapore 1988;17:541-4.
2. Arias-Santiago S, Buendía-Eisman A, Aneiros-Fernández J, Girón-Prieto MS, Gutiérrez-Salmerón MT, García-Mellado V, et al. Lipid levels in patients with lichen planus: a case control study. J Eur Acad Dermatol Venereol 2011;25:1398-401.
3. Dreiher J, Shapiro J, Cohen AD. Lichen planus and dyslipidaemia: a case-control study. Br J Dermatol 2009;161:626-9.
4. Atefi N, Majedi M, Peyghambari S, Ghourchian S. Prevalence of diabetes mellitus and impaired fasting blood glucose in patients with lichen planus. Med J Islam Repub Iran 2012;26:22-6.
5. Seyhan M, Ozcan H, Sahin I, Bayram N, Karincaoğlu Y. High prevalence of glucose metabolism disturbance in patients with lichen planus. Diabetes Res Clin Pract 2007;77:198-202.

6. Department of Statistics Singapore. Census of population 2010. Statistical release 1: demographic characteristics, education, language and religion. Available at: https://www.singstat.gov.sg/docs/default-source/default-document-library/publications/publications_and_papers/cop2010/census_2010_release1/cop2010sr1.pdf. Accessed on 9 December 2014.
7. Spravchikov N, Sizyakov G, Gartsbein M, Accili D, Tennenbaum T, Wertheimer E. Glucose effects on skin keratinocytes: implications for diabetes skin complications. Diabetes 2001;50:1627-35.
8. Sezer E, Ozugurlu F, Ozyurt H, Sahin S, Etikan I. Lipid peroxidation and antioxidant status in lichen planus. Clin Exp Dermatol 2007;32:430-4.
9. Meller S, Gilliet M, Homey B. Chemokines in the pathogenesis of lichenoid tissue reactions. J Invest Dermatol 2009;129:315-9.
10. Simark-Mattsson C, Bergenholtz G, Jontell M, Eklund C, Seymour GJ, Sugerman PB, et al. Distribution of interleukin-2, -4, -10, tumour necrosis factor-alpha and transforming growth factor-beta mRNAs in oral lichen planus. Arch Oral Biol 1999;44:499-507.

Yik Weng Yew, [1]*MBBS, MPH*, Yi Chun Lai, [2]*MD, MPH*, Roy Chan, [1]*MBBS, FRCP (UK), FAMS (Dermatology)*

[1]National Skin Centre, Singapore
[2]Harvard TH Chan School of Public Health, Harvard University, United States

Address for Correspondence: Dr Yew Yik Weng, National Skin Centre, 1 Mandalay Road, Singapore 308205.
Email: yikweng.yew@mail.harvard.edu

Factors Affecting Quality of Life in Adult Patients with Thalassaemia Major and Intermedia

Dear Editor,

Thalassaemia is one of the most common genetic disorders in Southeast Asian countries. It is a major health problem in Malaysia with a recent reported carrier rate of about 6.8%.[1] Patients with β-thalassaemia major (TM) require lifelong transfusion while patients with thalassaemia intermedia (TI) generally do not need regular blood transfusions but may still require medical attention at the later part of life due to complications of iron overload.

Although overall survival of TM patients has improved over the years due to global health efforts and the advances in medical management, quality of life (QOL) of these patients is reported to be poorer compared to the normal population.[2] It was also reported that up to 50% of thalassaemia patients have some forms of psychological disorders, e.g. anxiety and depression which correlate negatively with QOL.[3]

There have not been any studies which looked at the adult patients with thalassaemia in the Southeast Asian region. In this study, we hope to investigate the QOL of adult patients who have TM and TI and evaluate the clinical and psychological factors which may affect QOL.

Materials and Methods

This is a cross-sectional study where patients aged 18 years and above with TM and TI attending 2 major hospitals in Malaysia were recruited over a period of 3 months. The study was approved by both institutions' ethics committees. Patients were defined as TM when they are transfusion-dependent and TI when their haemoglobin levels remain between 7 g/dl to 10 g/dl without the need for regular blood transfusions. Patients' clinical information and iron overload complications were obtained from medical records. The most recent serum ferritin level was used and a level of ≤1000 μg/L was considered as well chelated.

Validated World Health Organization Quality of Life (WHOQOL)-BREF questionnaire was used to evaluate the QOL.[4] Permission for the use of the questionnaire was obtained. This questionnaire was chosen as it has been used before for thalassaemia patients.[2] The WHOQOL-BREF contains 26 questions – 1 question on overall perception of QOL, 1 question on overall perception of health while the remaining questions evaluate 4 domains of QOL: physical health, psychological, social and environmental. For the question on overall perception of QOL and health, the raw score was used. Scores of the 4 domains were calculated and transformed to a 0-100 scale, according to the manual provided. Higher score denoted higher QOL.

Symptoms of anxiety and depression were made based on Hospital Anxiety and Depression Scale (HADS). HADS had a total of 14 items which were divided into 2 subscales: anxiety subscale (7 items) and depression subscale (7 items).[5] A score of 0 to 7 indicates absence of symptoms of anxiety or depression; a score of 8 to 10 indicates presence of symptoms but to a moderate degree, and a score of 11 or greater indicates significant symptoms.[5] A score of 8 and above was used to indicate presence of symptoms of anxiety or depression.

Demographic characteristics and clinical information were analysed with mean score of QOL using chi-square or t-test where appropriate. Multiple linear regression analysis was used to determine any independent associations when needed. *P* value of <0.01 was considered as clinically significant. Data was analysed using the Statistical Package for Social Sciences (SPSS) version 17.0.

Results

Table 1 summarises the 127 patients' clinical demographic information and their QOL scores. The mean scores of all domains of QOL in relation to patients' characteristics including HAD scores are shown in Table 2. After multivariate analysis, patients with higher education level had significantly better physical and environmental scores. Patients with anxiety symptoms scored poorly in all domains of QOL except for overall perception of QOL while patients with depressive symptoms reported poorer scores in psychological, social and environmental domains (Table 3).

Discussion

It has been demonstrated that patients with thalassaemia have impaired QOL compared to healthy populations.[2,6] The overall QOL and health score of our adult thalassaemia patients are lower compared to those reported in healthy populations elsewhere in Malaysia.[7] In this study, patients

Table 1. Demographic Characteristic of Patients

	TI (n = 66) No (%)	TM (n = 61) No (%)	Total (n = 127) n (%)	*P* Value
Median age, years	33	25	28	0.0001*
Range	(18 – 65)	(18 – 44)	(18 – 65)	
Gender				
Male	18 (27)	30 (49)	48 (37.8)	0.011*
Female	48 (73)	31 (51)	79 (62.2)	
Race				
Malay	57 (86.4)	25 (41)	82 (64.1)	0.0001*
Chinese	9 (13.6)	32 (56)	43 (33.6)	
Indian	0	2 (3)	2 (1.6)	
Marital status				
Married	37 (56)	6 (10)	43 (34)	0.0001*
Single	29 (44)	55 (90)	84 (66)	
Education background				
Primary/secondary	38 (58)	38 (58)	68 (54.3)	0.35
College/university	27 (41)	27 (41)	58 (45.7)	
Household income				
≤RM 5000/month	55 (83)	44 (72)	99 (78)	0.13
>RM 5000/month	11 (17)	17 (28)	28 (22)	
Employment status				
Employed	37 (56)	39 (64)	76 (59.8)	0.36
Unemployed	29 (44)	22 (36)	51 (40.2)	
Presence of ≥1 complications	19 (29)	42 (69)	61 (48)	0.0001*
Serum ferritin ≤1000 μ/L	18 (27)	9 (15)	27 (21.3)	0.08
Chelating agents				
Yes	53 (80)	60 (98)	113 (88)	0.005*
No	13 (20)	1 (2)	14 (12)	
Types of chelating agents				
Desferrioxamine	8 (15)	15 (25)	23 (20)	0.0001*
Oral agents alone	36 (68)	17 (28)	53 (47)	
Combination	9 (17)	28 (47)	37 (33)	
Anxiety ≥8	20 (30)	20 (33)	40 (32)	0.7
Depression ≥8	8 (12)	12 (20)	20 (16)	0.2
Overall QOL score	3.82	3.67	3.75	0.25
Overall health score	3.58	3.23	3.41	0.68
Physical score	62.03	62.92	62.46	0.18
Psychological score	68.2	63.9	66.13	0.58
Social score	65.3	61.79	63.61	0.68
Environmental score	67.38	62.62	65.09	0.14

TI: Thalassaemia intermedia; TM: Thalassaemia major; QOL: Quality of life
*Statistically significant.

with TI generally reported better scores in most of the QOL domains although this was not statistically significant. In our study, the better QOL may be due to the lower complication rate and the less frequent need of transfusion in TI patients compared to TM patients. Patients who have higher education levels have significantly better physical health, and environmental scores. This may be explained by the possibility that patients who are of higher education

Table 2. Mean Scores of QOL with Patients' Socioclinical Demographic Characteristics

Variables	Overall QOL	Overall Health	Physical	Psychological	Social	Environmental
Gender						
Male	3.79	3.46	65.77	66.96	64.96	65.67
Female	3.72	3.38	60.44	65.63	62.80	64.75
Race						
Malay	3.94*	3.64*	64.53	70.20*	66.92*	69.29*
Chinese	3.40*	3.00*	58.50	59.00*	57.88*	57.52*
Marital status						
Married	3.88	3.65	63.95	72.00*	69.90*	69.36
Single	3.67	3.29	61.72	63.24*	60.51*	62.99
Education status						
Primary/secondary	3.59	3.29	58.58*	62.99	61.03	60.46*
College/university	3.93	3.55	67.07*	69.88	66.69	70.60*
Employment status						
Employed	3.76	3.41	64.80*	66.54	63.71	66.17
Unemployed	3.62	3.35	55.26*	63.85	61.74	60.59
Serum ferritin						
≤1000 µg/L	3.81	3.56	64.70	69.15	66.63	65.63
>1000 µg/L	3.73	3.37	61.85	65.32	62.80	64.95
Complications						
None	3.63	3.67*	59.48	69.35	67.50	68.62
≥1	3.82	3.12*	65.21	62.66	59.41	61.28
HADA score						
<8	3.92*	3.64*	67.31*	71.93*	67.99*	69.48*
≥8	3.40*	2.95*	52.33*	54.08*	54.70*	55.90*
HADD score						
<8	3.87*	3.56*	65.30*	69.85*	67.01*	69.48*
≥8	3.15*	2.70*	48.00*	47.25*	46.60*	49.85*

HADA: Hospital Anxiety and Depression Scale-Anxiety; HADD: Hospital Anxiety and Depression Scale-Depression; QOL: Quality of life
*P value <0.01.

Table 3. Multiple Linear Regression Analysis on QOL and Patients' Characteristics with Beta Coefficients Values

Variables	Overall QOL	Overall Health	Physical	Psychological	Social	Environmental
Gender	-0.023	-0.062	-0.190	-0.039	-0.076	-0.008
Diagnosis						
(TM/TI)	-0.049	0.020	-0.144	-0.078	-0.107	0.019
Ethnic						
(Malay/Chinese)	-0.235	-0.185	-0.092	-0.178	0.107	-0.214
Marital status	0.019	0.070	0.093	0.175	0.198	0.098
Employment status	0.024	-0.015	-0.138	0.203	0.011	-0.043
Education level	0.226	0.169	0.239*	0.162	0.097	0.238*
Household income	0.123	-0.064	0.016	0.012	0.066	0.064
Complications	-0.039	0.139	0.092	-0.008	0.087	0.028
Chelation status	-0.020	-0.033	-0.044	-0.022	-0.040	0.023
Anxiety	-0.189	-0.244*	-0.322*	-0.347*	-0.193	-0.252*
Depression	-0.168	-0.165	-0.221	-0.296*	-0.268*	-0.221*

TI: Thalassaemia intermedia; TM: Thalassaemia major; QOL: Quality of life
*P value <0.01.

levels are likely to be higher income earners with more financial resources and access to better healthcare.

It is worthy to note that only 22% of patients in our study are considered adequately chelated. It is likely that compliance and access to adequate dose of iron chelators are the possible factors. We found no significant difference in all aspects of QOL with serum ferritin level, which is consistent with the study by Safizadeh et al but contrary to other studies.[2,6,8] High rate of psychological stress in patients with thalassaemia had been consistently reported in many countries.[3,9] This is probably the first study which looks at the prevalence of anxiety and depression disorders in adult patients with thalassaemia in the Southeast Asian region. In this study, we found 32% of patients having symptoms suggestive of anxiety and 16% of depression. Presence of symptoms of anxiety and depression affect QOL. The relatively high prevalence of anxiety symptoms in our patients needs to be addressed especially since there is evidence which showed that anxiety disorders is associated with poor adherence to medication.[10] Therefore, it is important for the treating physicians to identify this and refer patients for appropriate counselling or therapy.

The limitations of this study include the small sample size, lack of age and gender-matched QOL scores for normal population and iron overload complications are recorded retrospectively.

Conclusion

Although we found no difference in QOL between patients with TM and TI, the lower QOL reported compared to the general population should be addressed. Psychological status of patients has significant effects on their QOL and this needs to be identified early so that appropriate therapies can be instituted.

REFERENCES

1. Jameela S, Sharifah Sabirah SO, Babam J, Phan CL, Visalachy P, Chang KM, et al. Thalassemia screening among students in a secondary school in Ampang, Malaysia. Med J Malaysia 2011;66:522-4.
2. Ansari Sh, Bagheselimi A, Azarkeivan A, Nojomi M, Hassanzadeh R. Quality of life in patients with thalassemia major. Iran J Ped Hematol Onco 2014;4:57-63.
3. Yengil E, Acipayam C, Kokacya MH, Kurhan F, Oktay G, Ozer C. Anxiety, depression and quality of life in patients with beta thalassemia major and their caregivers. Int J Clin Exp Med 2014;7:2165-72.
4. Skevington SM, Lotfy M, O'Connell KA. The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report of the WHOQOL Group. Qual Life Res 2004;13:299-310.
5. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand 1983;67:361-70.
6. Safizadeh H, Farahmandinia Z, Nejad SS, Pourdamghan N, Araste M. Quality of life in patients with thalassemia major and intermedia in Kerman-Iran (I.R.). Mediterr J Hematol Infect Dis 2012;4:e2012058.
7. Shaik MM, Hassan NM, Tan HL, Gan SH. Quality of life and migraine disability among female migraine patients in a tertiary hospital in Malaysia. Biomed Res Intern 2015; Article ID 523717:9 pages. Available at: www.hindawi.com/journals/bmri/2015/523717/cta/. Accessed on 22 May 2015.
8. Dahlui M, Hishamshah MI, Rahman AJA, Aljunid SM. Quality of life in transfusion-dependent thalassemia patients on desferrioxamine treatment. Sing J Med 2009;50:794-9.
9. Khoury B, Musallam KM, Abi-Habib R, Bazzi L, Ward Z, Succar J, et al. Prevalence of depression and anxiety in adult patients with ß-thalassemia major and intermedia. Int J Psychiatry Med 2012;44:291-303.
10. Mednick L, Yu S, Trachtenberg F, Xu Y, Kleinert DA, Giardina PJ, et al. Symptoms of depression and anxiety in patients with thalassemia: prevalence and correlates in thalassemia longitudinal cohort. Am J Hematol 2010;85:802-5.

Gin Gin Gan, [1]*MBBS, FRCP*, Yuen Ling Hue, [1]*MBBS*, Jameela Sathar, [2]*MBBS, MRCP, MPath*

[1]Department of Medicine, Faculty of Medicine, University Malaya, Malaysia
[2]Department of Haematology, Ampang Hospital, Malaysia

Address for Correspondence: Dr Gan Gin Gin, Department of Medicine, Faculty of Medicine, University Malaya, Kuala Lumpur 50603, Malaysia. Email: gangg@ummc.edu.my

A Case of a Patient with Neurofibromatosis Type I Presenting with Abdominal Pain

A 56-year-old gentleman presented to the emergency department after sustaining a fall secondary to an episode of giddiness. He was noted to be hypotensive in the ambulance and subsequently gave a history of non-specific abdominal pain for duration of 1 week. Imaging studies including an abdominal radiograph and a computed tomography (CT) of the abdomen and pelvis (CTAP) were performed to investigate his abdominal pain.

What do the abdominal radiograph (Fig.1), axial and coronal sections of the CT abdomen and pelvis (Figs. 2A, 2B and 2C) show? What is the diagnosis of the abdominal mass?

A. Intra-abdominal abscess
B. Carcinoid tumour
C. Lymphoma
D. Gastrointestinal stromal tumour (GIST)
E. Leiomyoma

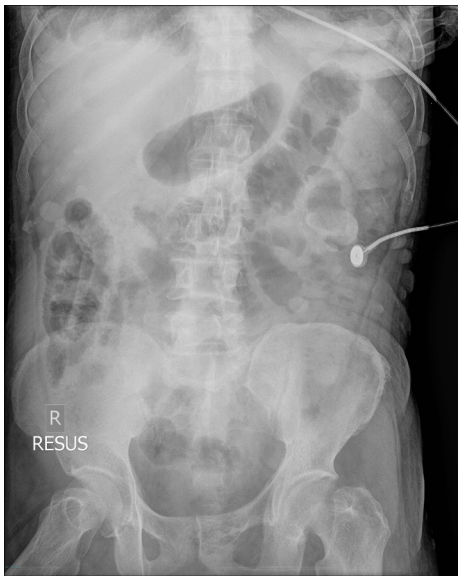


Fig. 1. Abdominal radiograph obtained at the time of presentation.

Findings and Diagnosis

The abdominal radiograph (Fig.1) reveals gaseous dilatation of the small bowel loops. Axial (Figs. 2A and 2B) and coronal (Fig. 2C) sections of the CTAP demonstrate a large thick-walled complex mass with gas and fluid debris within (white asterisks), closely related to the small bowel (dashed white arrow). Pneumoperitoneum and gross free fluid are evident. Innumerable cutaneous soft tissue nodules (white arrows) are also noted along the abdominal wall on the abdominal radiograph and CTAP, in keeping with the patient's known underlying neurofibromatosis type 1 (NF 1). Serum investigations revealed elevated values of the patient's total white cell count (22.0 x 103/uL [4.0-11.0]), C-reactive protein (60.9 mg/L [<3.0]), procalcitonin (11.68 ug/L [0.00-0.50]) and lactate (7.39 mmol/L [0.50-2.20]). The patient underwent explorative laparotomy in view of the pneumoperitoneum, which was indicative of a perforated hollow viscus.

Intraoperatively, a small bowel tumour was found to be arising from the mid jejunum with involvement of the adjacent ileum, dome of the urinary bladder, peritoneum and sigmoid mesocolon. The tumour was necrotic and there was evidence of perforation with large amounts of haemoperitoneum. Resection of the small bowel tumour was performed. Histology of the mass revealed a spindle cell subtype gastrointestinal stromal tumour (GIST) of the small bowel with central cystic cavitation. Immunohistochemistry stains of the mass were positive for CD 117, DOG-1 and CD 34, and negative for desmin and S100, compatible with GIST. Notwithstanding the tumour's low mitotic activity (0-1 mitosis/5 mm^2), the risk of progressive disease in this patient was considered high after taking into account the tumour's anatomic site (small bowel) and large size (13 cm).

In this particular case, the initial differential diagnoses considered were intra-abdominal abscess versus small bowel tumours given the appearance of the mass on CT and patient's raised inflammatory markers. However, note was made of an earlier CT study performed 5 years ago with similar findings. Hence, a small slow growing bowel malignancy was considered a more likely differential than an intra-abdominal abscess. Although carcinoid tumours, lymphoma and leiomyomas involving the small bowel

Answer: D

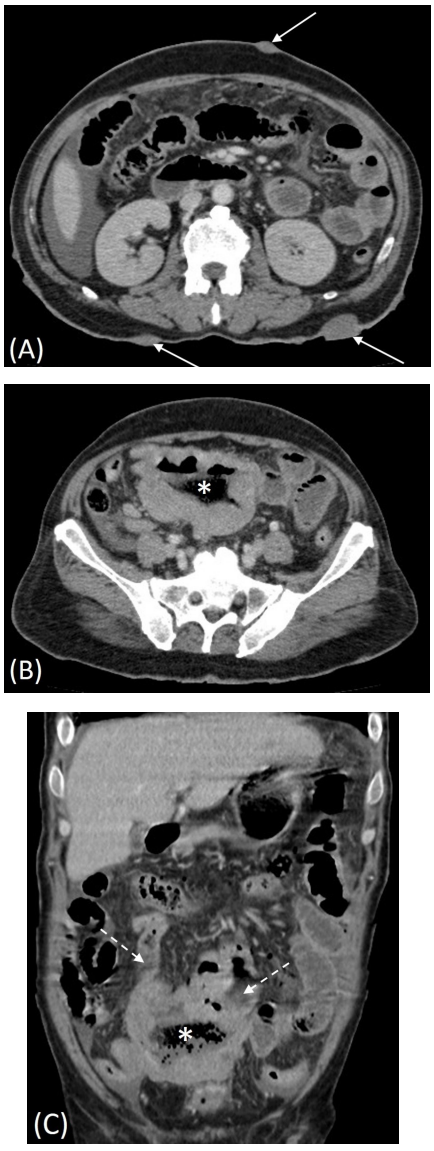


Fig. 2. Axial (A and B) and (C) coronal sections of the patient's CT of the abdomen and pelvis obtained on the same day following the abdominal radiograph.

are more common, a small bowel GIST was considered as the primary preoperative differential diagnosis in this case, after taking into consideration the indolent nature of the mass, the absence of significant intra-abdominal lymphadenopathy, as well as patient's history of NF 1 and its known association with GIST.

Discussion

Neurofibromatoses refer to 3 genetically inherited disorders, which are clinically and genetically distinct diseases. They include NF 1, neurofibromatosis type 2 and Schwannomatosis. These 3 conditions are grouped together because they share certain clinical features, however it is important to distinguish them from the others as they differ in their natural history, complications and management. They do not evolve into one of the other forms during the course of the disease.[1]

NF 1 also known as Von Recklinghausen's disease or peripheral neurofibromatosis, is the most common form of neurofibromatosis. The disease bears the name of Friedrich von Reckling-hausen (1833-1910), a German pathologist, who was not the first to report the disease but the first to recognise that the characteristic peripheral neurofibromas developed from nervous tissue. It has an incidence of 1 in 3000 births and prevalence of 1 in 4000-5000.[2,3]

The NF 1 gene has been identified on chromosome 17q11.2 and the protein product termed neurofibromin acts as a tumour suppressor.[4] Hence, alterations in the NF 1 gene result in this disease. This gene has one of the highest spontaneous mutation rates in humans and about 50% of those patients with NF 1 do not have a family history.[5] When a positive family history is present, NF 1 is inherited as an autosomal dominant disorder.

Due to the large size of the NF 1 gene and lack of mutation hot spots, it is not practical to use mutation analysis as the initial tool for identifying NF 1.[5] The diagnosis of NF 1 is hence based on the presence of at least 2 of the major clinical criteria established by the National Institutes of Healthcare (NIH) Consensus Development Conference in 1988.[5] The major diagnostic features of NF 1 include café au-lait patches, neurofibromas, skin-fold freckling, iris Lisch nodules, optic pathway glioma and bony dysplasia. Macrocephaly, short stature and cutaneous angiomas are minor diagnostic features of the disease.[2] It is often difficult or impossible to establish the diagnosis of this disease based on the above characteristic clinical features in young children, as these features may not be entirely present at birth and tend to accumulate with age.[1]

The more commonly encountered manifestations of NF 1 include neurological (plexiform neurofibromas, malignant peripheral nerve sheath tumour (MPNST), optic and non-optic nerve gliomas), cardiac (congenital heart disease particularly pulmonic valvular stenosis), vascular (renal artery stenosis, cardiovascular and cerebrovascular disease), and orthopaedic (scoliosis, pseudoarthrosis, bowing of the tibia) disorders.[2]

The median age at death among NF 1 patients is approximately 15 years earlier than would be expected amongst the general population, and about a third of them die from complications before the age of 45 years. The most common causes of premature death in NF 1 patients are namely vasculopathy, MPNST and central nervous system tumours.[1]

Gastrointestinal manifestations of NF 1 include visceral neurogenic tumours, GIST and neuroendocrine tumours. The reported frequency of gastrointestinal manifestations of NF 1 in previous studies ranges from 5% to 25%.[5] Clinical symptoms include abdominal pain, dyspepsia, vomiting, anaemia, malaena, hematemesis, hematochezia, intussception, volvulus, small bowel obstruction, fever and abdominal mass.[6] The gastrointestinal manifestations related to NF 1 usually present much later in life than the cutaneous manifestations of the disease. Previous studies have shown that approximately 2.5% of NF 1 patients on regular follow-up develop gastrointestinal complications requiring surgical intervention at a median age of 40 years.[5,6]

The association of GIST with NF 1 has been increasingly described in the medical literature and they represent the most common gastrointestinal manifestation of NF 1.[4,5] In all reported cases thus far, GIST occurring in patients with NF 1 have been localised to the small bowel, and not uncommonly associated with other synchronous GIST tumours or other types of intestinal neoplasms. These patients most commonly present with abdominal pain and bleeding.[4] GIST tumours occurring in patients with or without NF1 are identical in histology and immunophenotype. The distinguishing feature of GIST in patients with NF 1 is that it predominates in the small bowel and their tendency for multiplicity. GIST originates from or near the muscularis propria of the intestinal wall and may display intramural, intraluminal or extraluminal extension. Intratumoral hemorrhage, necrosis and degeneration are also often present.

Histological studies of small bowel GIST most often reveal spindle cell morphology with numerous skeinoid fibres.[5] Immunohistochemical demonstration of CD 117 and CD 34 positivity distinguishes GIST from leiomyomas and leiomyosarcomas.[4,7] There is no difference between the biologic behaviour of GIST in patients with or without NF 1 and the tumours can be benign, malignant or have uncertain malignant potential.[4] This notwithstanding, most NF 1-associated GIST tumours commonly present with small tumours with low mitotic activity (<5/50 high-power fields) and generally follow a benign clinical course.[5]

Radiologically, the imaging features of GIST in patients with or without NF 1 are similar. These tumours appear as a heterogenous enhancing mass with areas of haemorrhage and/or cystic change. They are intramural in location and can either extend intraluminally simulating a polypoidal mass or exophytically into the mesentery.[4]

Conclusion

NF 1 is the most common of the phakomatoses. Due to the varied clinical manifestations and predisposition of the NF 1 gene for spontaneous mutation, many with the disease present with no pre-existing diagnosis or positive family history.

Although less commonly encountered when compared to the neurological, cardiac, vascular and orthopaedic complications of this disease, it is important to be aware and recognise the gastrointestinal manifestations of NF 1 such as the small bowel GIST reported in our case, as this will aid both the referring clinician and the reporting radiologist in making a presumptive diagnosis of this disorder on imaging.

REFERENCES

1. Friedman JM, Gutmann DH, MacCollin M, Riccardi VM. Neurofibromatosis: phenotype, natural history and pathogenesis. Baltimore, MD: John Hopkins University Press;1999. p. 169-81.
2. Ferner RE. Neurofibromatosis 1. Eur J Hum Genet 2007;15:131-8.
3. Fortman BJ, Kuszyk BS, Urban BA, Fishman EK. Neurofibromastosis type I: a diagnostic mimicker at CT. Radiographics 2001;21:601-12.
4. Levy AD, Patel N, Dow N, Abbott RM, Miettinen M, Sobin LH. From the archives of the AFIP. Abdominal neoplasms in patients with neurofibromatosis Type 1: radiologic-pathologic correlation. Radiographics 2005;25:455-80.
5. Agaimy A, Vassos N, Croner RS. Gastrointestinal manifestations of Neurofibromatosis Type 1 (Recklinghausen's disease): clinicopathological spectrum with pathogenetic considerations. Int J Clin Exp Pathol 2012;5:852-62.
6. Behranwala KA, Spalding D, Wotherspoon A, Fisher C, Thompson JN. Small bowel gastrointestinal stromal tumours and ampullary cancer in Type 1 neurofibromatosis. World J Surg Oncol 2004;2:1.
7. Miettinen M, Lasota J. Gastrointestinal stromal tumours: pathology and prognosis at different sites. Semin Diagn Pathol 2006;23:70-83.

Shi Yuan Wang, [1]*MBBS, FRCR*, Tien Jin Tan, [1]*MBBS, FRCR*

[1]Department of Radiology, Changi General Hospital, Singapore

Address for Correspondence: Dr Wang Shi Yuan, Department of Radiology, Changi General Hospital, 2 Simei Street 3, Singapore 529889.
Email: wshiyuan@yahoo.com.sg

"Right Iliac Fossa Pain": More Than Meets the Eye

A 29-year-old female Filipino domestic worker presented to the Emergency Department of Changi General Hospital with a 1-day history of right iliac fossa pain and vomiting. The patient was febrile with a body temperature of 38.3°C and she had a raised total white blood cell count of 17.0 x 10^3/uL (4.0-10.0).

What do the computed tomography (CT) scan images (Figs. 1A and 1B) and corresponding post-appendicectomy histological photomicrographs (Figs. 2A and 2B) show? What is the diagnosis?

A. Eosinophilic appendicitis
B. Mucinous adenoma of the appendix
C. Schistosomal appendicitis
D. Mucinous adenocarcinoma of the appendix
E. Leiomyoma of the appendix

Findings and Diagnosis

Axial and coronal CT scan images (Figs. 1A and 1B) demonstrate mild thickening of the appendix associated with mural calcification (indicated by the white arrows). Minimal periappendiceal fat stranding was present, suggesting the presence of an early acute appendicitis. There was however, no pneumoperitoneum or localised periappendiceal collection to suggest the presence of gross appendiceal perforation at the time of imaging. The patient also had mural calcification of the rectosigmoid junction (Fig. 3, indicated by the white arrow). Laparoscopic appendicectomy was performed, which revealed an acute appendicitis but there was no evidence of appendiceal perforation. Histopathological evaluation of the resected appendix showed transmural inflammation of the appendix with ulceration of the mucosa (Fig. 2A). There were also numerous ovoid bodies present within the mucosa, muscularis propria and the serosal region, many of which

Fig. 1. A) Axial and B) coronal CT images of the pelvis which were obtained at the time of clinical presentation.

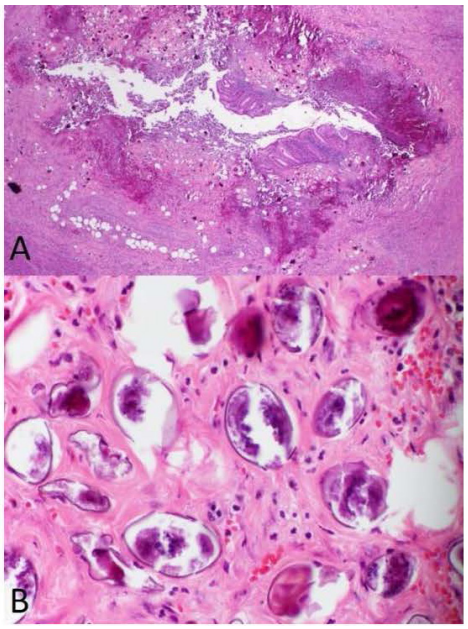


Fig. 2. Histological photomicrographs of the appendicectomy specimen at A) low (x 20) and B) high powered (x 400) magnifications (H&E stain).

Answer: C

Fig. 3. Axial CT image of the pelvis demonstrates mural calcification of the rectosigmoid junction (white arrow).

were calcified and contained coarse purplish granules within the cytoplasm (Figs. 2A and 2B). The diagnosis was schistosomal appendicitis.

Discussion

Schistosomiasis is a tropical disease caused by blood-dwelling fluke worms of the genus Schistosoma, with approximately 200 million people being affected worldwide.[1] The transmission cycle requires contamination of surface water by excreta, specific freshwater snails as intermediate hosts, and human water contact. The main schistosomes infecting human beings are: *S. mansoni*, which causes intestinal and hepatic schistosomiasis in Africa, the Arabian peninsula and South America; *S. haematobium* which causes urinary schistosomiasis in Africa and the Arabian peninsula; and *S. japonicum* which causes intestinal and hepatosplenic schistosomiasis in China, the Philippines, Thailand and Indonesia.[1] *S. japonicum* is a zoonotic parasite that infects a wide range of animals including cattle, dogs, pigs and rodents. *S. mansoni* is also found in rodents and primates, but human beings are the main host.

Adult *S. japonicum* worms often reside and produce ova in the mesenteric veins of their human hosts, in particular the inferior mesenteric vein. While some ova penetrate the intestinal wall and are excreted along with faecal matter, the remaining ova either become implanted within the intestinal wall (which includes the appendix), or migrate upstream to the liver via the portal vein.[2] Schistosomiasis as a cause of acute appendicitis is rarely seen in developed countries, and if so encountered are commonly found in those who have travelled or emigrated from endemic areas.[3-7] Terada and his colleagues from Japan reported an incidence of only 0.32% in their series of 311 appendicectomies.[7] There are 2 mechanisms involved in the pathogenesis of schistosomal appendicitis. The first is an immunological granulomatous reaction to newly deposited ova causing tissue necrosis and eosinophilia which may occur in the early phase of the infection. The second is related to the obstruction of the appendiceal lumen in the late stage of the infection (after several months to years) by chronic inflammation and fibrosis surrounding the dead ova, thereby increasing the risk of superadded infection.[8]

Lee et al correlated the imaging finding of intestinal mural calcification seen on CT in cases of *S. japonicum* infection, with the calcification of ova deposited within the intestinal wall including that of the appendix.[9] CT scans are now frequently performed to evaluate patients who present with an acute abdomen in order to exclude a surgical cause such as an acute appendicitis.[10] Since there is no pathognomonic clinical or operative finding, careful evaluation for the presence of intestinal or appendiceal mural calcification on CT will therefore alert the clinician to the possibility of underlying schistosomal infection, and the potential need for treatment with antihelminthic drugs, as seen in the case reported by Tang and his colleagues.[11]

Colonic calcification seen with schistosomiasis infection should be differentiated from other causes such as phlebosclerotic colitis, renal failure, hyperphosphataemia (including treatment with lanthanum), mucinous adenocarcinomas, and leiomyomatous tumours of the colon and rectum. Phlebosclerotic colitis usually involves the right-sided colon as compared with distal colonic involvement in schistosomiasis. The characteristic CT imaging features of this rare form of colitis includes calcification of the veins of the colonic wall and adjacent mesentery, collateral formation, thickening and oedema of the colonic wall, and increased density of the surrounding mesenteric fat.[12] Varying degrees of colonic calcification have also been reported in patients with renal failure and hyperphosphataemia, as well as in patients who were treated with lanthanum for the latter condition.[13-15] Distinguishing patients with these conditions from those with suspected intestinal schistosomal infection can however, be readily made based on clinical grounds. Mucinous adenocarcinomas and leiomyomatous tumours of the colon and rectum may also demonstrate intratumoural calcification. These tumours can be differentiated from cases of intestinal schistosomal infection by the presence of colonic wall thickening (often eccentric), associated with bulky, heterogeneously enhancing mural masses which may show areas of hypoattenuation or cystic degeneration.[16,17]

Conclusion

Although rarely encountered in developed countries, schistosomiasis should be suspected as a cause of an acute appendicitis in patients who have emigrated or are travelling from endemic areas, and in the presence of appendiceal mural calcification on CT.

REFERENCES

1. Gryseels B, Polman K, Clerinx J, Kestens L. Human schistosomiasis. Lancet 2006;368:1106-18.
2. Ross AG, Bartley PB, Sleigh AC, Olds GR, Li Y, Williams GM, et al. Schistosomiasis. N Engl J Med 2002;346:1212-20.
3. Weber G, Borer A, Zirkin HJ, Riesenberg K, Alkan M. Schistosomiasis presenting as acute appendicitis in a traveler. J Travel Med 1998;5:147-8.
4. Kanoksil W, Larbcharoensub N, Soontrapa P, Phongkitkarun S, Sriphojanart S, Nitiyanant P. Eosinophilic appendicitis caused by Schistosoma japonicum: a case report and review of the literature. Southeast Asian J Trop Med Public Health 2010;41:1065-70.
5. Adehossi E, Parola P. Schistosomal appendicitis. Lancet Infect Dis 2004;4:498.
6. Madavo C, Hurriez H. Schistosomiasis of the appendix. J R Soc Med 2006;99:473-4.
7. Terada T. Schistosomal appendicitis: incidence in Japan and a case report. World J Gastroenterol 2009;15:1648-9.
8. Satti MB, Tamimi DM, Al Sohaibani MO, Al Quorain A. Appendicular schistosomiasis: a cause of clinical acute appendicitis? J Clin Pathol 1987;40:424-8.
9. Lee RC, Chiang JH, Chou YH, Rubesin SE, Wu HP, Jeng WC, et al. Intestinal schistosomiasis japonica: CT-pathologic correlation. Radiology 1994;193:539-42.
10. Abujudeh HH, Kaewlai R, McMahon PM, Binder W, Novelline RA, Gazelle GS, et al. Abdominopelvic CT increases diagnostic certainty and guides management decisions: a prospective investigation of 584 patients in a large academic center. AJR Am J Roentgenol 2011;196:238-43.
11. Tang DCW, Sung THT, Lam MW, SCS Cheng. Computed tomography detection of schistosomal appendicitis. Hong Kong J Radiol 2014;17:277-80.
12. Kusanagi M, Matsui O, Kawashima H, Gabata T, Ida M, Abo H, et al. Phlebosclerotic colitis: imaging-pathologic correlation. AJR Am J Roentgenol 2005;185:441-7.
13. de Vries JH, Scholten ET, Schut NH. Small and large bowel: new localizations of visceral ectopic calcifications. Nephrol Dial Transplant 1994;9:827-8.
14. Eckstein J, Savic S, Eugster T, Pargger H, Gurke L, Pechula M, et al. Extensive calcifications induced by hyperphosphataemia caused by phosphate-based enema in a patient after kidney transplantation. Nephrol Dial Transplant 2006;21:2013-6.
15. Cerny S, Kunzendorf U. Images in clinical medicine. Radiographic appearance of lanthanum. N Engl J Med 2006;355:1160.
16. Ko EY, Ha HK, Kim AY, Yoon KH, Yoo CS, Kim HC, et al. CT differentiation of mucinous and nonmucinous colorectal carcinoma. AJR AM J Roentgenol 2007;188:785-91.
17. Lee SH, Ha HK, Byun JY, Kim AY, Cho KS, Lee YR, et al. Radiological features of leiomyomatous tumors of the colon and rectum. J Comput Assist Tomogr 2000;24:407-12.

Tien Jin Tan, [1]*MBBS, FRCR*, Victor WL Ng, [2]*MBBCh BAO, FRC Path (UK)*, Kok Ren Lim, [3]*MBBS, MMed (Surg), MRCS (Edin)*

[1]Department of Radiology, Changi General Hospital, Singapore
[2]Department of Laboratory Medicine, Changi General Hospital, Singapore
[3]Department of General Surgery, Changi General Hospital, Singapore

Address for Correspondence: Dr Tan Tien Jin, Department of Radiology, Changi General Hospital, 2 Simei Street 3, Singapore 529889.
Email: tien_jin_tan@cgh.com.sg

Cradle Memories of SGH*

Keng Thye Woo, [1]*FAMS, FRACP*

Our orientation lecture, freshies
At the Pathology Lecture Theatre in SGH
Professor of Medicine, Gorden Arthur Ransome
Addressing his new batch of medical embryos
Speaking impressively
He told us, what he expected;
Regaling us with stories of Sir William Osler,
How we should emulate Somerset Maugham,
Because of his medical training
Able to write vivid tales of human passion

Because doctors were privileged
To study and to understand
Human nature in its raw.
He exhorted us to become keen detectives
Like Sherlock Holmes,
To acquire excellent clinical acumen
To arrive at an accurate diagnosis,
The hallmark of good medicine

The Anatomy Professor, R Kanagasunthiram, brilliant mind
Always wearing unkempt off white medical overall
Smelling of formalin and cadaverine
A veteran of Gray's Anatomy
Where he was oft quoted
When he first appeared in class
Adjusting the standing microphone

We mistook him for the attendant
Until he commenced to draw
Colourful anatomy plates on the blackboard;
If he catches you sleeping during tutorial
He would quietly pat you
On the back and say, "Come here my friend"

I well recall our Social Medicine classes
The lecturer, a towering Ang Moh
With a beard like Burl Ives, equally handsome
Would place his chair on top of the table
And there sit, peering down upon us
To ensure we pay attention,
Half the time we were focused
On his jokes rather than his lessons,
And when end of term test came
Half the class failed

We were taught Neurophysiology
By none other than the deputy PM
Out first lecture, a truculent guy
With a short fuse to his temperament
In full PAP white
Stood on a high stool
So he could reach and project his slides
All muddled up by his assistant.

Throughout the lecture
He maintained a repetitive rebuke
On his quivering assistant
Glaring at him but managed
To deliver a didactic lecture
On the electrophysiological
Impulse of the somatic nerve.

If you are posted to Surgery B Unit
To Mr Yahya Cohen's Unit
And you are rostered to assist him in OT
You know you had it.
For any slight mistake
You get rapped on the knuckles
With his stainless steel retractor.

On the occasion I was to assist him
At the Operation Theatre, he asked me
Young man, what do you think
Of our Prime Minister Mr Lee Kuan Yew?
I was taken aback
Such a tricky question;
And for what seemed a long pause
Before I blurted out the answer
He is a great man, I said

*An abridged version. The original full length is published at the Singapore General Hospital's intranet.

[1]Department of Renal Medicine, Singapore General Hospital, Singapore
Address for Correspondence: Prof Woo Keng Thye, Department of Renal Medicine, Singapore General Hospital, Outram Road, Singapore 169608.
Email: woo.keng.thye@singhealth.com.sg

Why? he asked me,
An even longer pause before my answer,
He cried for his country.
I watch him last night on TV
He stopped his operation,
Looked at me, I cringed,
Then I could detect the smile
In his eyes above his mask
His answer, one word, Good.

One of the most beloved
Among all our clinical teachers
Was the Professor of Medicine
Professor Gorden Arthur Ransome
You always look forward
To his bedside tutorials
So interesting and much to learn
He was known as GAR
To his friends and colleagues
For us, he was simply Prof

Fortunately for me
I was in his tutorial group
With personal teaching from him
You learn more from him
By observing his methods;
The way he goes about
Taking a history from the patient,
Eliciting physical signs.

His clinical acumen was unsurpassed
He was a kind and patient teacher
He communicated so well even without speaking
An Englishman who did not speak dialect
But through his eyes, his smile
And body language,
His patients understood,
In return, they smile or cry,
Pour out their woes to him.
He in turn, touches their pain
Comforts, leaves them to heal.
Often he would find my physical signs
And my diagnosis at fault
He would proceed to show us
His approach to the problem
And where we went wrong.

A young boy with jaundice and hepatitis
He asked if liver punch was positive
I confessed I did not know,
He gave a hard thump
Over the boy's abdomen
The boy cried like an aeroplane at take off
GAR smiled and said it's a sham.
We were so upset,
For the boy was crying
And GAR was smiling.
How cruel, I thought.
How do you know it's a sham? we asked GAR
Why? There are no tears in his eyes,
He cried from hurt dignity.
GAR tickled the boy's toes
With a coloured feather
The boy burst out, shrieking delight
Tears of joy down both cheeks.

Professor Sir Gorden Arthur Ransome
Embodies all the wholesome goodness of Medicine;
Beneath his warm and candid smile
Satiated with good wine and pigeon brand cigarettes
His whole physical being, his heart, his mind, his soul
Brims with all the core values and greatness
Of an astute, dedicated and noble physician.

His legacy lives on among his countless
Students, his medical embryos, disciples,
All those who have been taught by him
And have passed through
The portals of SGH under his tutelage.

Indeed the hands of Prof Ransome
Had truly rocked that first Cradle of Medicine.
He was the beginning but not the end
As he had fashioned us, his embryos.
His benevolent smile and kindly disposition
Will live forever in our memories;
As we walk in his footsteps
Tracing footprints of his medical RNA.

SGH 195th Anniversary
18th May 2016

Dr Woo Keng Thye

ANNALS, ACADEMY OF MEDICINE, SINGAPORE
81 Kim Keat Road, #11-00 & #12-00 NKF Centre, Singapore 328836
Tel: +65 6593 7800 | Fax: +65 6593 7867 | E-mail: annals@ams.edu.sg | Homepage: http://www.annals.edu.sg