

CASE REPORT

A malnourished post-stroke man with multi-morbidity and sarcopenia risk in a long-term stroke clinic: A case report

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Tay CL, Ishak NH, Ali MF, Zawawi NSM, Aziz NA. A malnourished post-stroke man with multi-morbidity and sarcopenia risk in a long-term stroke clinic: A case report. *Malays Fam Physician*. 2023;18:12. <https://doi.org/10.51866/cr.281>

Keywords:

Stroke, Sarcopenia, Enteral nutrition

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Abstract

A 78-year-old post-stroke man with multiple comorbidities who was activity of daily living-dependent developed aspiration pneumonia associated with nasogastric tube (NGT) blockage. He presented with malnutrition and risk of sarcopenia with hypoalbuminaemia, small calf circumference (CC), low body mass index and small mid upper arm circumference. He showed symptoms of moderate-to-severe vascular dementia with behavioural psychological stress disorder, resulting in carer stress. Psychoeducation among the carers and referral to a neuro-psychiatrist were ensued after outpatient-based team meeting discussion. Herein, we highlight the importance of screening for sarcopenia and nutritional status in post-stroke patients with the use of the CC and serum albumin level as well as the involvement of a multidisciplinary team in the primary care setting to improve patient outcomes. Percutaneous endoscopic gastrostomy tubes are more suitable than NGTs for post-stroke patients who require enteral feeding to improve the nutritional status.

Introduction

Post-stroke patients are at risk of multiple complications, especially in the elderly. One of the least identified is sarcopenia, which is commonly misinterpreted to be associated with ageing. Stroke-related sarcopenia (SRS) refers to the loss of skeletal muscle mass and strength in patients with stroke caused by paralysis-related inactivity and dysphagia-related malnutrition.^{1,2} It is a burden among patients and healthcare systems as it carries four-fold higher risk of malnutrition in patients with SRS.³ Thus, early identification of and intervention for sarcopenia are beneficial in reducing the risk of malnutrition, disability and mortality up to 1-year post-stroke.⁴

Calf circumference (CC) measurement is a simple, rapid and effective screening method for sarcopenia, which is easily performed in primary care settings.⁵ In patients with stroke, the cut-off CC for sarcopenia is <31 cm in men and 30 cm in women.⁵ Under-nutrition involves inadequate nutrition and inflammatory effects of comorbidity, leading to hypoalbuminaemia which reduced life quality and expectancy; thus, it can be used as one of the parameters for nutritional status.^{6,7} This case illustrates SRS which often is overlooked when managing patients post-stroke. We hope that physicians

could detect post-stroke patients with sarcopenia and malnutrition, for early interventions.

Case presentation

A 78-year-old Chinese man with underlying diabetes mellitus, hypertension, chronic rheumatic heart disease and atrial fibrillation experienced right middle cerebral artery infarction in May 2021. He developed left-sided hemiparesis, rendering him fully dependent for almost all activities of daily living with a modified Rankin scale score of 4.

He also had slurred speech and dysphagia, dependent on Ryle's tube parenteral feeding. The silicon Ryle's tube was changed monthly instead of every 3 months due to frequent blockage despite regular flushing post-feeding. He had three admissions for aspiration pneumonia owing to Ryle's tube blockage from July 2021 to February 2022. He suffered from urinary incontinence and fecal constipation, which was relieved with laxatives. In addition, he had vascular dementia. His family had hired a trained Filipino caretaker to help with nursing and daily care.

On examination, he was alert and conscious and appeared pink while sitting on his wheelchair with Ryle's tube in-situ. (Figure 1). His speech

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was slurred. His vital signs were stable. He had malnourished features, with a body mass index (BMI) of 17.5 kg/m², right mid upper arm circumference (MUAC) of 25 cm (normal value: >25.5 cm), right CC of 30 cm and left CC of 26 cm (normal value: >31 cm). His left hemiplegic hand was oedematous due up to the level of the wrist. Central nervous system examination showed hypertonia and hyperreflexia of the left limbs with power of 1/5. The left shoulder was subluxated. Other examinations revealed unremarkable findings.

Cognitive assessment using the Montreal Cognitive Assessment showed severe cognitive impairment with a score of 6. Depression was screened using the Two Questions with Help Questionnaire, wherein the patient scored 0. He had a Modified Barthel Index (MBI) of 40 and Lawton Instrumental Activities of Daily Living scale score of 0.

Blood investigation results were unremarkable,

except for a low albumin level (33 g/L). Echocardiogram showed an ejection fraction of 65%, biatrial dilatation, mild mitral regurgitation, moderate tricuspid regurgitation and calcified aortic valve with trivial aortic regurgitation. Brain computed tomography during admission for stroke showed haemorrhagic transformation and hydrocephalus with a midline shift.

He was managed by the neuromedical team in the ward for acute stroke in May 2021. He underwent stroke rehabilitation in the ward by a multidisciplinary therapist ie speech-language therapy for dysphagia and enteral feeding and physiotherapy for muscle-strengthening exercises. He was also under the care of a rehabilitation physician After being discharged from the ward, he was referred to our long-term stroke care clinic for follow-up where a multidisciplinary team meeting was conducted. **Table 1** shows the details of the Stroke Multi-Disciplinary Meeting (STRIDE HCTM).

Table 1. Details of issues discussed in the Stroke Multi-Disciplinary Meeting, Hospital Canselor Tuanku Muhriz (STRIDE HCTM).

Issues raised during the meeting	<ol style="list-style-type: none"> 1. Stroke-related sarcopenia 2. Choking with saliva and risk of aspiration pneumonia 3. Moderate-to-severe vascular dementia with behavioural psychological stress disorder 4. Urinary incontinence
Proposed suggestions/approaches to the issues raised	<ol style="list-style-type: none"> 1. To add protein supplement during alternate meals for hypoalbuminaemia 2. To guide patient for deep inhalation to reduce choking. Percutaneous endoscopic gastrostomy tube placement was suggested. 3. To refer to a neuro-psychiatrist for moderate-to-severe vascular dementia with behavioural psychological stress disorder and to provide psychoeducation to caretakers 4. To place patient on diapers for urinary incontinence

Clinical assessment followed by videofluoroscopy for swallowing study showed that his swallowing was unsafe and ineffective. There was marked post-swallow residue in the valleculae and pyriform fossa. The risk of aspiration was explained to his caretakers. Swallowing rehabilitation was attempted; however, he did not show favourable progress and hence required enteral feeding. For long-term enteral feeding, the use of a percutaneous endoscopic gastrostomy (PEG) tube was

suggested, as the benefits outweighed the risks. The other management are as in **Table 1**.

The patient continued Ryle’s tube feeding, as his family members refused to consent for PEG. The family members opted to continue with swallowing therapy and thin liquid despite the risks of aspiration. However, his condition deteriorated in early November 2022, and he succumbed to death due to sepsis and aspiration pneumonia.



Figure 1. Image of the patient, who was sitting on a wheelchair, showing muscle wasting of the bilateral lower limbs (more prominent on the left side) and on a Ryle's tube.

Discussion

Malnutrition

Based on the Global Leadership Initiative on Malnutrition, the new criteria of malnutrition require at least one aetiologic criterion and one phenotypic criterion. Reduced food intake or assimilation, disease burden and inflammatory condition were categorized as aetiologic criteria. Unintentional weight loss, declining muscle loss and BMI of $<18.5 \text{ kg/m}^2$ were categorised as phenotypic criteria.⁸ Mid upper arm circumferences (MUAC) can be an alternative measurement to BMI indicating nutritional status as a MUAC of $\leq 25.5 \text{ cm}$ was associated with a BMI of $\leq 20 \text{ kg/m}^2$.⁹ Our patient's low BMI and small MUAC fulfilled the criteria of malnutrition. BMI is not a satisfactory tool for assessing nutritional status, as it has a 'U' or 'J' relationship with mortality in older people and fails to differentiate between lean and obese patients.¹⁰ After ruling out of infection clinically, our patient with multiple comorbidities had a high level of a catabolic state, resulting in loss of

protein from the muscle and subsequently hypoalbuminaemia.¹¹

Enteral feeding

The patient experienced multiple difficulties while being on NGT feeding such as nasopharyngeal discomfort, tube blockage despite adequate tube flushing and aspiration pneumonia.¹² We suggest for a PEG tube placement as it can improve the nutritional status of the patient by getting a higher rate of delivery of feeding with lesser complication especially in cases where parental feeding is required for more than 4 months.¹³ Shared decision-making with the patient and family members should be made, as there are also possible complications of PEG tube placement, such as peristomal infection, leakage of gastric or intestinal fluid around the stoma, gastric mucosal ulceration, tube blockage, mortality and morbidity.¹²

Screening of SRS

SRS refers to the loss of skeletal muscle mass and strength. It is caused by paralysis-related inactivity and dysphagia-related malnutrition.² According to the Asian Working Group for Sarcopenia, sarcopenia is diagnosed when both muscle mass and handgrip strength are less than the normal values.¹⁴ Handgrip strength measurement requires a hand dynamometer, which costs more than 1000 RM; this method may not be feasible in all public health clinics in Malaysia. There are two practical ways of SRS screening in primary care settings: using the SARC-F questionnaire and measuring the calf's circumferences (CC). The SARC-F questionnaire that rapidly screens for sarcopenia using self-reported data about falls, stair climbing, rise from a chair, assistance walking and strength; there are three possible scores for each of these five items, with a total score of ≥ 4 indicating positive screening for sarcopenia.¹⁵ CC measurement is a simple, rapid and effective sarcopenia screening method for patients with stroke. The measurements were taken in the morning using a flexible tape ruler to wrap the thickest part of the bilateral lower legs, perpendicularly around the lower leg axis, to decrease the effect of oedema.¹⁴ Both legs were measured three times, and the highest value of the measurements was recorded. The non-paralysed CC was used for diagnosis and screening.¹⁶ A study in China indicated that CC measurement is better than the SARC-F questionnaire for screening SRS. Our patient's

non-paralysed CC was 30 cm, considered at risk of SRS. A cohort study found that the CC combined with the albumin level had a good predictive value for mortality in immobile patients, and interventions such as high protein nutritional recommendations and resistance exercises could be offered to improve muscle mass.¹⁷

STRIDE HCTM

A pragmatic and collaborative post-stroke care may help in meeting the changing needs of stroke survivors and their caregivers at different times and stages of recovery.¹⁸ The STRIDE HCTM, consists of physicians (family medicine, neurology, rehabilitation medicine), stroke nurse, dietitian, medical social worker, and stroke rehabilitation therapists, was set up following considerations on post-stroke care resources in HCTM. This session has allowed clinicians together with stroke survivors and their caregivers to discuss and negotiate their care needs. Since its establishment in February 2022, seven cases have been discussed, covering a wide range of post-stroke care aspects such as medical issues, secondary prevention, community participation and caregivers support. The meeting is in line with the needs for a stroke care algorithm in managing stroke cases in the community, which are often complex and have multiple complications, that are in need of continuous follow-up from stroke providers whether in the hospital or primary care clinic.²⁰

Conclusion

Early identification and intervention of sarcopenia are beneficial in reducing the risk of malnutrition. In a busy clinic setting, the CC and albumin level are useful for screening sarcopenia and nutritional status especially in post-stroke patients. PEG tube feeding may be suggested for post-stroke patients who require long-term enteral feeding. Cognitive screening and carer stress should be identified in each clinic visit for better quality of care holistically. A multidisciplinary approach should be advocated for comprehensive care among all post-stroke patients and carers.

Acknowledgements

The authors would like to thank the patient's daughter and director of Hospital Canselor Tuanku Muhriz, Universiti Kebangsaan Malaysia for permitting the publication of this case report.

Conflicts of interest

All authors declare no conflicts of interest.

Patient's consent for the use of images and content for publication

Written consent was obtained from the patient's daughter.

What is new in this case report compared to the previous literature?

- This case report highlights the importance of screening for sarcopenia and nutritional status especially in post-stroke patients.
- Measurement of the calf circumference and albumin level is useful for screening sarcopenia and nutritional status in primary care settings.
- Percutaneous endoscopic gastrostomy tube feeding is better than nasogastric tube feeding for post-stroke patients who require long-term enteral feeding.
- Cognitive function and carer stress should be screened in each clinic visit for post-stroke patients.
- A multidisciplinary approach is important to provide continuous monitoring and follow-up for post-stroke patients and caretakers by both hospital and primary care stroke providers.

What is the implication to patients?

After screening of sarcopenia and nutritional status, an effective intervention from a dietician, physiotherapist and speech therapist was initiated for the improvement of the patient's nutritional status. The patient's vascular dementia with behavioural psychological stress disorder was under controlled, and carer stress was reduced after psychoeducation and intervention from a neuro-psychiatrist.

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