SHORT REPORTS

Oropharyngeal dysphagia in an elderly post-operative hip fracture population: a prospective cohort study

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Abstract

Background: normal ageing processes impact on oropharyngeal swallowing function placing older adults at risk of developing oropharyngeal dysphagia (OD). Anecdotal clinical experience has observed that older patients recovering from hip fracture surgery commonly develop OD post-operatively.

Objective: to document the presence of OD following hip fracture surgery, and the factors associated with OD.

Methods: one hundred and eighty-one patients with a mean age of 83 years (range: 65–103) admitted to a specialised orthogeriatric unit were assessed for OD post-surgery for hip fracture. Pre-admission, intra-operative and post-operative factors were examined to determine their relationship with the presence of OD.

Results: OD was found to be present post-operatively in 34% (n = 61) of the current population. Multivariate logistic regression analyses revealed the presence of pre-existing neurological and respiratory medical co-morbidities, presence of post-operative delirium, age and living in a residential aged care facility prior to hospital admission to be associated with the post-operative OD.

Conclusion: these results highlight that OD is present in a large number of the older hip fracture population. Early identification of OD has important implications for the provision of timely dysphagia management that may prevent secondary complications and potentially reduce the hospital length of stay.

Keywords: dysphagia, hip fracture, incidence, prediction, elderly, older people

Introduction

Oropharyngeal dysphagia (OD) has been reported to be a highly prevalent condition among older adults residing in aged care facilities, living in the community and in the acute hospitalised setting [1–5]. Anatomical and physiological changes that occur to swallowing-related structures as a result of the normal ageing process have been well documented [6–10]. With the addition of stressors such as illness or surgery, functional reserve may be reduced [10] and impact on functional swallowing capacity. The consequences of developing OD can be significant for both the individual and the healthcare provider. Not only can OD lead to the development of aspiration pneumonia, malnutrition and dehydration, it can also significantly contribute to an increased hospital length of stay and healthcare costs [11]. Timely assessment and management of OD in at-risk populations is therefore essential in minimising the impact of OD.

The incidence of hip fracture is continuing to rise in Australia due to our ageing population and population growth [12, 13]. Anecdotal clinical experience suggests that older patients recovering from hip fracture surgery are a
population that frequently present with OD post-operatively. It is unknown whether OD in this population is a pre-existing condition, or a complication of hip fracture surgery. To date, there is no research investigating OD post-hip fracture surgery or the factors that may be related to OD in the acute orthogeriatric population. Therefore, the aim of this study was to investigate the presence of OD following hip fracture surgery in the older population. Additionally, pre-admission, intra-operative and post-operative factors that may be associated with OD post-surgery were determined.

Methods

Patients admitted consecutively to a specialised orthogeriatric unit within a metropolitan hospital over a 9-month period were considered for inclusion (n = 199). Patients aged 65 and over, admitted for hip fracture surgery irrespective of previous medical co-morbidities associated with dysphagia (e.g. neurological co-morbidities), were eligible for inclusion to ensure the cohort was representative of the presenting clinical population. The resultant sample was 181 patients (54 males and 127 females) with an average age of 83.8 ± 8 years. Potential participants excluded were < 65 years old (n = 6), did not provide consent or were discharged or deceased prior to a swallowing assessment (n = 12).

A clinical swallowing assessment [14] was conducted by a speech pathologist within 72 h of surgery following medical approval for oral intake to document the presence of OD. The assessment included case history taking, and a clinical swallowing examination (CSE). The pre-operative OD status was based on information provided by the patient, family or residential aged care facility (RACF) through a structured interview including information about previous swallowing function (e.g. coughing/choking at meals) and food texture and fluids consumed prior to admission. Australian national standards for texture-modified diets and fluids were used to guide this questioning [15]. The CSE consisted of an examination of the oral musculature, perceptual evaluation of voice quality and a series of oral food and fluid trials consistent with the Australian Standards for Texture Modified Food and Fluids [15].

OD was considered present when clinical signs of reduced swallowing efficacy or reduced swallowing safety were observed by the speech pathologist. Definitions of clinical signs of reduced swallowing efficacy (e.g. reduced lip seal, oral residue and multiple swallows per bolus) and reduced swallowing safety (e.g. coughing or choking after swallowing) were consistent with those used by Serra-Prat et al. [16]. Instrumental assessment of swallowing function [e.g. videofluoroscopy (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES)] was not feasible due to post-operative restrictions related to positioning and delirium, and availability (FEES).

Clinical factors known on admission such as age, living environment, previous medical and surgical history; intra-operative and post-operative factors were obtained from medical records. These specific variables were identified for inclusion based on previous literature [17] and clinical experience. This project was approved by the local hospital ethics committee HREC/11/QPCH/9.

Data were entered into an Excel 2003 (Microsoft, Redmond, WA, USA) spreadsheet, and statistical analysis was performed using PASW version 19.0. Descriptive statistics were used to document the rate of OD and summarise the demographic, intra-operative and post-operative characteristics of the cohort. Univariate logistic regression was conducted to identify explanatory variables associated with a diagnosis of OD. The explanatory variables included age, pre-admission accommodation, presence of neurological, respiratory, cardiac and, ear, nose and throat (ENT) co-morbidities, number of medical co-morbidities, type of anaesthesia, intensive care unit admission post-operatively and the development of delirium post-operatively. Explanatory variables associated with the outcome variable (P < 0.25) as well as those based on theoretical assumptions were then included in a model-building stage whereby forward stepwise multivariate logistic regression was employed [18].

Results

Population characteristics

The majority were female (70.2%), aged 65–103 years (mean = 83.8 ± 8.1SD), and were primarily (60.7%) living in the community pre-admission. The most common medical comorbidity was previous neurological condition. There were no new neurological events post-operatively, but delirium was present in 33% of the cohort. An average length of hospital stay was 16.1 ± 9.4 days (range: 3–53).

Prior to admission, 92.8% (n = 168) of patients were reported to have no clinical signs of OD and were managing a normal diet (including a full and soft textures according to national standards) with 175 patients (96.7%) tolerating thin fluids. All the patients admitted on thickened fluids were from an RACF, while 11 of 13 on modified diets came from an RACF (Table 1).

Presence of OD

OD was present in 61 (34%) of 181 patients within 72 h post-hip fracture surgery. Fifteen patients had documented OD prior to admission, and for eight of these patients, their post-operative diet and fluids were at a lower level. Following initial assessment, three patients (1.6%) were placed nil by mouth, while 16% of patients (n = 28) required modification of fluids, and 19.3% (n = 35) required a texture-modified diet (minced and moist or smooth pureed). Approximately 76% of the patients requiring a texture-modified diet or fluids displayed signs of impaired swallowing efficacy (n = 41) including increased mastication time and presence of oral residue post-swallow; and 23 patients (42.6%) demonstrated signs of impaired swallowing safety (i.e. coughing or choking).
52%, whereas existing respiratory co-morbidities. Sensitivity of the model was followed by post-operative delirium and the presence of pre-existing neurological co-morbidities, with a value of 66.7% and a negative predictive value of 81.3%.

Fracture surgery. Previous studies have reported high prevalence rates of OD in the elderly population, and this study suggests that the orthogeriatric population may be at the higher end of these estimates despite pre-admission reports that pre-existing dysphagia was low. This may suggest that OD is under-recognised or under-diagnosed in the ageing population, and therefore admission for an acute surgical or medical issue may provide an opportunity to assess and manage this condition. Speech pathologists as the health professionals who manage OD therefore need to be considered as key members of the orthogeriatric team.

There are a number of factors that may be associated with OD in the elderly population. This study identified that those patients with a pre-existing neurological or respiratory comorbidity, who developed post-operative delirium, were living in an RACF pre-admission, and were of an older age, were more likely to be diagnosed with OD post-operatively. The development of OD is multifactorial and could be considered part of a geriatric syndrome [16]. Therefore, older and more frail patients such as those among the elderly hip fracture population should be screened routinely for OD post-operatively.

The current study provides useful insights for the management of the orthogeriatric population, but some limitations can be acknowledged. The reliance on CSE as the method to identify the presence of OD post-operative dysphagia diagnosis. However, VFSS or FEES which are considered the ‘gold standards’ in swallowing assessment [19] were not feasible due to patient characteristics or availability (FEES). It is also acknowledged that pre-admission swallow function was based upon patient, family or nursing staff reports and may therefore have underestimated the presence of pre-surgical OD in the cohort. Consideration was given to assessing swallow function prior to surgery to obtain a baseline; however, this was not considered feasible and may also not have represented pre-morbid abilities due to pain and medication levels immediately pre-surgery. Additionally, the majority of patient were required to be nil by mouth in preparation for surgery, thereby precluding the assessment of swallowing function.

The current study found that 34% of elderly patients presented with OD post-hip fracture surgery. Factors that could be related to OD (presence of neurological and respiratory co-morbidities, post-operative delirium, living in a RACF, increasing age), which could be used as criteria when screening for OD in the orthogeriatric population, were also identified.

### Table 1. Population characteristics of the whole population post-hip fracture surgery

<table>
<thead>
<tr>
<th>Population variable</th>
<th>n</th>
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<tbody>
<tr>
<td>Gender</td>
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<tr>
<td>Male</td>
<td>54</td>
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<td>Female</td>
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<tr>
<td>RACF</td>
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<td>38.7</td>
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<tr>
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<td>54.1</td>
</tr>
<tr>
<td>Trochanteric</td>
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<td>45.9</td>
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<tr>
<td>Surgery type</td>
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<td>Internal fixation</td>
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<td>ICU admission</td>
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<td>3.9</td>
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<tr>
<td>Presence of delirium post-surgery</td>
<td>60</td>
<td>33.1</td>
</tr>
</tbody>
</table>

THR, total hip replacement; RACF, residential aged care facility; ENT, ear, nose and throat; GA, general anaesthetic; ICU, intensive care unit.

### Establishing factors related to OD following surgery

Univariate logistic regression analyses describing relationships between the occurrence of OD and explanatory variables found that the presence of OD is associated with age, living in an RACF prior to admission, number of medical co-morbidities, presence of neurological and respiratory co-morbidities and post-operative delirium ($p < 0.25$). The presence of cardiac and ENT co-morbidities and admission to ICU post-surgery were not related to OD diagnosis, and therefore not entered into the multivariate logistic regression model. Although type of anaesthesia was not strongly associated with OD, it was included based on clinical assumption that type of anaesthesia during surgery may impact swallowing function.

A forward stepwise multiple logistic regression model was used and the best model to predict the presence of OD post-operatively ($p < 0.05$) included the explanatory variables of age, living in an RACF prior to admission, the presence of neurological and respiratory co-morbidities and the development of delirium post-operatively (see Table 2). The strongest factor was the presence of pre-existing neurological co-morbidities, followed by post-operative delirium and the presence of pre-existing respiratory co-morbidities. Sensitivity of the model was 52%, whereas specificity was 89% with a positive predictive value of 66.7% and a negative predictive value of 81.3%.

### Discussion

This prospective cohort study demonstrates that OD is present in a large number of elderly patients following hip fracture surgery. Previous studies have reported high
Early identification and management of OD is imperative for the prevention of secondary complications such as aspiration pneumonia, malnutrition and dehydration. Further clinical research is required to determine whether OD post-operatively is a transitory or permanent complication.

Key points

- Approximately 34% of older patients presented with OD within 72 h following hip fracture surgery.
- The three strongest factors related to OD were the presence of pre-existing neurological conditions, development of delirium post-operatively and presence of pre-existing respiratory conditions.
- Older patients should be screened for OD following hip fracture surgery.

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Conflicts of interest

None declared.

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References


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