Dysphagia and its Relationship to Medication Intake in Parkinson’s Disease

Background
Dysphagia is common in PD and assumed to complicate medication intake. However, there are few studies which have systematically assessed dysphagia during medication swallowing and its relation to motor complications.

Objective
This study attempted to obtain a comprehensive picture of medication intake dysphagia in Parkinson’s disease (PD). Specific investigations included 1) An objective, graduated and multidimensional classification of medication dysphagia in PD, 2) the association of medication dysphagia and motor complications, 3) the prevalence of medication dysphagia in relation to oral dosage form and normal bolus dysphagia and 4) predictors of medication dysphagia.

Methods
A classification of medication dysphagia was developed based on a retrospective analysis. In a prospective study, 66 PD patients then underwent flexible endoscopic evaluation of swallowing, which included swallowing of 4 dosage forms (small and large tablets [10-17mm length] and capsules [19 – 29mm length]).

Results
• A two-dimensional, graduated, and reliable classification of medication dysphagia was introduced which differentiated between swallowing efficiency (impaired clearing, dissolution) and safety (risk of aspiration).
• Medication dysphagia predicted motor complications according to the MDS-UPDRS p-IV in a linear regression model. Swallowing efficiency, but not safety, differed by oral dosage form, with capsules tending to be swallowed more efficiently than tablets, irrespective of size.
• There was a moderate correlation between normal bolus dysphagia and medication dysphagia, although in individual cases, patients with severe medication dysphagia did not have normal bolus dysphagia.
• A score of ≥1 on the swallow-related MDS-UPDRS-items 2.3 and 2.4 can be considered as optimal cut-off for predicting medication dysphagia (sensitivity: 70.8%, specificity: 70.7%).

Classification of medication dysphagia

<table>
<thead>
<tr>
<th>Ordinal level</th>
<th>Swallowing efficiency</th>
<th>Swallowing safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: No impairment</td>
<td>The medication is swallowed completely during the first swallowing attempt without dissolving.</td>
<td>The medication is swallowed without any risk of penetration or aspiration.</td>
</tr>
<tr>
<td>1: Mild impairment</td>
<td>The medication is not swallowed during the first attempt but is easily swallowed with additional attempts without dissolving.</td>
<td>The medication or water spills prematurely into the pharynx before swallowing or remains there prolonged after swallowing, but no penetration or aspiration occurs.</td>
</tr>
<tr>
<td>2: Moderate impairment</td>
<td>The medication is temporarily stuck in the oropharynx and can only be cleared with intensive swallowing attempts (≥5 attempts or additional water drinking) and/or there are minimal signs of dissolution (coating of the mucosa).</td>
<td>The medication or water penetrates into the laryngeal vestibule, but is effectively cleared by protective reflexes.</td>
</tr>
<tr>
<td>3: Severe impairment</td>
<td>The medication cannot be swallowed completely and partially dissolves.</td>
<td>The medication or water penetrates into the laryngeal vestibule, despite protective reflexes it is not cleared.</td>
</tr>
<tr>
<td>4: Very severe impairment</td>
<td>The medication cannot be swallowed at all and/or completely dissolves.</td>
<td>The medication or water penetrates into the laryngeal vestibule without attempts to clear it or is aspirated.</td>
</tr>
</tbody>
</table>

Conclusions
• Medication dysphagia is present in nearly 70% of PD patients and possibly predisposes to motor complications.
• Capsules, irrespective of size, tend to be swallowed more efficiently than tablets. Medication dysphagia should be evaluated independently of normal bolus dysphagia.
• The swallow-related MDS-UPDRS items may be used as screening parameters for medication dysphagia with moderate sensitivity and specificity.

Demographics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
</table>
| Mean age ± 50 in years | 65.4 ± 8.8 | Normal bolus OD, n (%) | No signs 20 (36.3%)
| Gender m/f | 44/22 | Mild 38 (57.0%)
| Hoehn & Yahr, n (%) | | Moderate 5 (7.6%)
| 2 | 29 (43.9%) | Severe 3 (4.5%)
| 2.5 | 10 (15.2%) | Medication dysphagia, n (%) | No signs 22 (33.8%)
| 3 | 17 (25.5%) | Mild 20 (30.3%)
| 4 | 9 (13.0%) | Moderate 15 (22.7%)
| 5 | 1 (1.5%) | Very severe 6 (9.1%) |

OD-Oropharyngeal Dysphagia

FEES-Flexible Endoscopic Evaluation of Swallowing
NRS-Numeric Rating Scale

Contact details:
Bendix Labeit: Bendixruven.Labeit@ukmuenster.de;
Arik Zur: Arik.Zur@clexio.com

*This study was supported by Clexio Biosciences Ltd.