VESTIBULAR PHYSIOTHERAPY

—the pivot in the contemporary ethical and rational management of balance disorders

Dr Anirban Biswas
Vertigo and Deafness Clinic
Kolkata, INDIA
Physiotherapy and vestibular physiotherapy

**Physiotherapy** - treatment of disease, deformity and/or disability by physical methods such as massage / heat treatment, / exercise / physical workouts rather than by medicines or by surgery.
Physiotherapy and vestibular physiotherapy

**Vestibular Physiotherapy**- Physical therapy to restore balance function after it has been deranged by disease. Acts by:-

1. Enhancing the vestibular compensatory mechanism
2. Improving the general balance function and sharpening the balancing skills of the subject
3. Enhancing the functionality of a damaged part of the vestibular labyrinth or of a deranged mechanism in the vestibular system
ETHICAL & RATIONAL MANAGEMENT OF VERTIGO

Drugs
- Non specific Symptomatic therapy
- Specific therapy to treat the underlying disorder

Maneuvers
- For Benign Positional vertigo

Physical Therapy
- Non specific Vestibular Exercises
- Organ specific Vestibular Physiotherapy
- Cawthorne Cooksey Exercises
- Tai Chi / Yoga / Virtual Reality
Objectives of management of vertigo

- **Provide symptomatic relief** – *taking care of the inherent ill-effects of anti-vertigo drugs*

- **Diagnose the cause of the vertigo and treat the cause of the vertigo** rather than merely suppress & camouflage the symptom of vertigo

- **Treat the co-morbidities** *esp the psychological and cognitive impact of the balance disorder*

- **Restore the deranged balance function and reassure** *the patient as most such patients are in severe physical and mental distress*
What is new in today’s scenario??

- Our understanding of vestibular physiology has undergone immense refinement; *the morbidity of the balance disorder patient is now better understood*

- Any lesion in the vestibular system can be very precisely diagnosed with pin-point accuracy

- Very specific treatment is available for most causes of balance disorders today; *management now involves treating the co-morbidities also*

- Vestibular physiotherapy targeted to specific organs in the vestibular system is now a reality; virtual reality is being used for improving balance function

Anirban Biswas, Neurotologist
• VESTIBULAR COMPENSATION is the mainstay of therapy in all peripheral vestibular lesions esp if unilateral, and also in some central lesions

• VESTIBULAR COMPENSATION is enhanced and facilitated by VESTIBULAR REHABILITATION THERAPY (VRT) which are exercises consisting of HEAD / BODY / EYE movements to increase sensory conflicts.

• Recurrence of symptoms are often due to decompensation and not due to recurrence of disease, hence re-initiation of exercises is the recommended protocol for recurrence of symptoms

• Even if drugs for symptomatic relief are used, only such drugs are to be chosen that do not inhibit vestibular compensation i.e., do not cause sedation / CNS depression

Anirban Biswas, Neurootologist
Types of Physical Therapies

Anirban Biswas,
Neurologist

ORGAN-SPECIFIC VESTIBULAR PHYSIOTHERAPY is possible today - we can specifically stimulate the compromised vestibular sense organ after VESTIBULOMETRY has identified the defect.
Functions of different parts of the vestibular labyrinth as we know today
Each part of the vest. labyrinth senses a different type of head movement and are all equally important.
1) Each part of the vestibular labyrinth has a specific function.

2) Functional integrity of each part of the vestibular labyrinth can be evaluated and at different frequencies of vestibular stimulation.
### Specific tests for each anatomical part

<table>
<thead>
<tr>
<th>ANATOMICAL PART tested</th>
<th>NAME OF INVESTIGATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral SC canal</td>
<td>ENG / VNG (at low freq)</td>
</tr>
<tr>
<td>Lateral SC canal</td>
<td>vHIT (at high freq)</td>
</tr>
<tr>
<td>Anterior SC canal</td>
<td>vHIT (at high freq)</td>
</tr>
<tr>
<td>Posterior SC canal</td>
<td>vHIT (at high freq)</td>
</tr>
<tr>
<td>Utricle</td>
<td>oVEMP, SVV</td>
</tr>
<tr>
<td>Saccule</td>
<td>cVEMP</td>
</tr>
<tr>
<td>Sup Vest nerve</td>
<td>ENG/VNG/oVEMP/ VHIT</td>
</tr>
<tr>
<td>Inf Vest nerve</td>
<td>cVEMP / VHIT</td>
</tr>
<tr>
<td>Oculomotor system</td>
<td>Oculomotor tests of VNG</td>
</tr>
<tr>
<td>Sense of gravitational vertical</td>
<td>Sub. visual vertical (SVV)</td>
</tr>
<tr>
<td>Neural pathways</td>
<td>NCV, SSEP</td>
</tr>
</tbody>
</table>
The story so far:

- The physiology & functional anatomy of the vestibular system is now unambiguously known.

- Modern vestibulometry now allows us to specifically identify the defective organ in the vestibular system and also detect the underlying disorder causing vertigo.

- Treatment paradigms for vertigo have now changed and non-specific vestibular sedatives and non-specific exercises are now a thing of the past.

- The new therapy module in balance disorder pts is TARGETED & SPECIFIC TREATMENT both for pharmacotherapy as well as for physiotherapy.
Organ targeted vestibular physiotherapy
Organ targeted vestibular physiotherapy

THERAPY FOR DYSFUNCTION OF LATERAL CANAL
Organ targeted vestibular physiotherapy
Organ targeted vestibular physiotherapy
Organ targeted vestibular physiotherapy

Therapy for stimulating the anterior and posterior semi-circular canals
Organ targeted vestibular physiotherapy

THERAPY FOR DYSFUNCTION OF LEFT ANTERIOR & RIGHT POSTERIOR CANAL

THERAPY FOR STIMULATING THE ANTERIOR AND POSTERIOR SEMI-CIRCULAR CANALS
Organ targeted vestibular physiotherapy

THERAPY FOR DYSFUNCTION OF SACCULE
Organ targeted vestibular physiotherapy

THERAPY FOR DYSFUNCTION OF SACCCULE
High frequency stimulation of the saccule
Organ targeted vestibular physiotherapy

THERAPY FOR DYSFUNCTION OF UTRICLE
Organ targeted vestibular physiotherapy

THERAPY FOR DYSFUNCTION OF UTRICLE
Organ targeted vestibular physiotherapy

THERAPY FOR STIMULATING /SENSITISING PROPRIOCEPTORS IN THE SOLES OF THE FEET
Vestibular physiotherapy for balance improvement

THERAPY FOR GENERAL BALANCE IMPROVEMENT & STIMULATING PROPRIOCEPTORS
Physiotherapy for improvement of gait
Physiotherapy for improvement of coordination
Virtual Reality (VR) in vestibular physiotherapy
Virtual Reality (VR) in vestibular physiotherapy
Results of our study on 53 patients

Assessed Pre-therapy and Post therapy by:-
  • Activity Balance Confidence Scale,
  • Burg Balance Scale
  • Dizziness Handicap Inventory scale

• Results show:-
  • Gross improvement in all three parameters after 10 sessions Average improvement in the scores was between 30% to 85%
A Controlled Study on 30 patients with OTOLITH dysfunction
15 with Cawthrone-Cooksey Exercises only and 15 with our specific organ targeted physiotherapy

<table>
<thead>
<tr>
<th>SUBJECTS</th>
<th>VESTIBULOMETRY</th>
<th>PHYSICAL THERAPY INTERVENTION</th>
<th>ABC (%) PRE TREAT</th>
<th>ABC (%) POST TREAT</th>
<th>BBS(_/56)PRE TREAT</th>
<th>BBS(_/56)POST TREAT</th>
<th>DHI PRE TREAT</th>
<th>DHI POST TREAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUB 9</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>62</td>
<td>92</td>
<td>38</td>
<td>50</td>
<td>24</td>
<td>10</td>
</tr>
<tr>
<td>SUB 10</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>30</td>
<td>90</td>
<td>38</td>
<td>56</td>
<td>30</td>
<td>12</td>
</tr>
<tr>
<td>SUB 4</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>50</td>
<td>86</td>
<td>38</td>
<td>46</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>SUB 14</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>50</td>
<td>90</td>
<td>36</td>
<td>52</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>SUB 27</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>50</td>
<td>90</td>
<td>34</td>
<td>50</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>SUB 31</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>54</td>
<td>90</td>
<td>36</td>
<td>54</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>SUB 45</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>46</td>
<td>90</td>
<td>39</td>
<td>52</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>SUB 50</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>50</td>
<td>92</td>
<td>43</td>
<td>55</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>SUB 51</td>
<td>ab utricular</td>
<td>Specific organ therapy, Balance training</td>
<td>62</td>
<td>94</td>
<td>45</td>
<td>54</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>SUB 22</td>
<td>sacculus</td>
<td>Specific organ therapy, Balance training</td>
<td>40</td>
<td>60</td>
<td>32</td>
<td>46</td>
<td>34</td>
<td>16</td>
</tr>
<tr>
<td>SUB 37</td>
<td>sacculus</td>
<td>Specific organ therapy, Balance training</td>
<td>38</td>
<td>86</td>
<td>39</td>
<td>54</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>SUB 44</td>
<td>sacculus</td>
<td>Specific organ therapy, Balance training</td>
<td>45</td>
<td>88</td>
<td>38</td>
<td>52</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>SUB 64</td>
<td>sacculus</td>
<td>Specific organ therapy, Balance training</td>
<td>42</td>
<td>92</td>
<td>36</td>
<td>52</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>SUB 66</td>
<td>sacculus</td>
<td>Specific organ therapy, Balance training</td>
<td>40</td>
<td>90</td>
<td>34</td>
<td>50</td>
<td>32</td>
<td>8</td>
</tr>
<tr>
<td>SUB 80</td>
<td>sacculus</td>
<td>Specific organ therapy, Balance training</td>
<td>46</td>
<td>94</td>
<td>38</td>
<td>54</td>
<td>30</td>
<td>6</td>
</tr>
<tr>
<td>SUB 6</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>50</td>
<td>64</td>
<td>34</td>
<td>42</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>SUB 15</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>40</td>
<td>58</td>
<td>32</td>
<td>38</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>SUB 25</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>42</td>
<td>60</td>
<td>34</td>
<td>40</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td>SUB 30</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>48</td>
<td>64</td>
<td>38</td>
<td>42</td>
<td>28</td>
<td>24</td>
</tr>
<tr>
<td>SUB 36</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>40</td>
<td>56</td>
<td>30</td>
<td>38</td>
<td>32</td>
<td>24</td>
</tr>
<tr>
<td>SUB 6</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>38</td>
<td>56</td>
<td>30</td>
<td>39</td>
<td>28</td>
<td>22</td>
</tr>
<tr>
<td>SUB 12</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>36</td>
<td>52</td>
<td>28</td>
<td>38</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>SUB 18</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>48</td>
<td>66</td>
<td>36</td>
<td>40</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>SUB 38</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>46</td>
<td>66</td>
<td>36</td>
<td>42</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>SUB 65</td>
<td>ab utricular</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>44</td>
<td>64</td>
<td>34</td>
<td>38</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>SUB 78</td>
<td>sacculus</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>42</td>
<td>60</td>
<td>32</td>
<td>38</td>
<td>26</td>
<td>22</td>
</tr>
<tr>
<td>SUB 76</td>
<td>sacculus</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>48</td>
<td>66</td>
<td>35</td>
<td>40</td>
<td>30</td>
<td>26</td>
</tr>
<tr>
<td>SUB 82</td>
<td>sacculus</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>52</td>
<td>68</td>
<td>38</td>
<td>42</td>
<td>32</td>
<td>38</td>
</tr>
<tr>
<td>SUB 58</td>
<td>sacculus</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>50</td>
<td>68</td>
<td>38</td>
<td>46</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>SUB 61</td>
<td>sacculus</td>
<td>Cawthrone-Cooksey Exercises</td>
<td>48</td>
<td>62</td>
<td>36</td>
<td>44</td>
<td>28</td>
<td>24</td>
</tr>
</tbody>
</table>
Special findings:

Patients with PPV and PPPD showed

- remarkable improvement with VR therapy +SSRI and 4pts who had drowsiness with SSRIs, showed improvement in all the 3 parameters only with VR+ balance improvement exercises

- Patients with semi-circular canal dysfunction but no known disease
  - significant improvement with PT for specific canals

- Patients with utricular hypo-activity
  - partial improvement with PT for utricular stim

- Patients with saccular derangement
  - significant improvement with low and high freq saccular stim
Take home message

• A new look and a new mind-set for management of vestibular disorders is warranted in the current scenario

• Organ / system targeted vestibular physiotherapy is very effective, result-oriented and based on scientific logic

• Virtual Reality therapy is very effective for many types of psychogenic balance disorders

• TARGETED and SPECIFIC THERAPY both for drugs as well as for physical therapy is the most effective treatment modality to be embraced by clinicians

Thank you
Physical Therapy

THERAPY FOR IMPROVEMENT of COORDINATION & GENERAL BALANCE