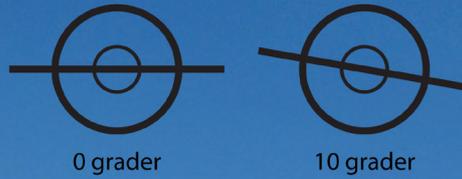


# How to get straight about torsion



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On August 27, 2020, Sara Flodin defended her thesis, "On Cyclodeviation – Strategies for Investigation, Management and Quality of Life," at the Department of Clinical Neuroscience. The project was conducted at the Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg. Her main supervisor was Marita Andersson Grönlund MD, PhD, University of Gothenburg & Sahlgrenska University Hospital with co-supervisors Agneta Rydberg, DBO, PhD and Tony Pansell, PhD at the Karolinska Institute, Stockholm.

## Key points:

- Always take a good case history
- Ensure repeatability and reliability of testing—choose the most appropriate test
- Maintain individual-based assessment & management

The perception of subjective tilting does not always accompany ocular torsion, and vice versa. Patients rarely complain specifically about cyclodiplopia. Therefore, it is important to understand the processes behind cyclodeviation, how the condition affects compensatory mechanisms, and the implications for everyday life.

**Aims & Methods:** (1) To test the reliability and repeatability of three measurement techniques (single Maddox rod (SMR), KMScreen, and the synoptophore) in adults with a vertical deviation.

(2) To investigate normative subjective cyclotorsion values and cyclofusion ranges in a non-strabismic 18 to 69-year-olds, using the synoptophore and SMR. (3) To evaluate surgical outcomes and the management of cyclodeviation by reviewing preoperative assessments and post-operative results from 2012 to 2019. (4) To assess the effect of cyclodeviation on health-related quality of life (HRQoL) using the Adult Strabismus-20 (AS-20) questionnaire in adults with cyclodeviation. The pre- and postoperative scores were compared with scores from a non-strabismic control group.

**Introduction:** Cyclodeviation is a form of strabismus that is not externally visible. It is measured subjectively and in degrees, as incyclotorsion or excyclotorsion. The

**Results:** (1) Although all tests showed high correlation and repeatability, there were significant differences among clinical tests, especially the synoptophore and the SMR. (2) All ages showed low subjective torsion, demonstrating excyclotorsion with a mean of -1 degree. (3) Post-operative results of the modified Harada-Ito procedure corresponded to the sought-after correction, yet the dose-effect relationship was variable. (4) There was a significant difference in preoperative scores between patients and controls. Post-operative scores significantly improved for patients.

**Conclusion:** Investigating cyclodeviation requires detailed diagnostic testing, which can greatly influence the management and outcome of patient care. Reference data of cyclotorsion and cyclofusion in clinical settings suggests that even a small increase in cyclotorsion (>2 degrees) may disrupt the ability to fuse binocular images. Fusion evaluation and individually based preoperative assessments

are key to determining individual doses for successful surgical outcomes. Evaluating HRQoL in strabismus management expands assessments. Patients complaining of double vision or difficulty maintaining binocularity should be assessed for cyclodeviation, which may be the cause.

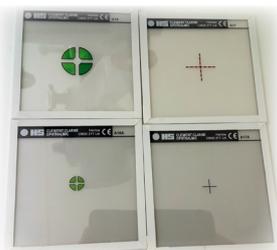


Figure 1. Slides used to assess cyclotorsion.



Figure 2. Synoptophore used to measure cyclodeviation

## Articles in the dissertation

1. Flodin S., et al. Cyclotorsion Measured in a Patient Population Using Three Different Methods: A Comparative Study. *Strabismus* 2016; 24(1): 28-36.
2. Flodin S., et al. Clinical Measurements of Normative Subjective Cyclotorsion and Cyclofusion in a Healthy Adult Population. *Acta Ophthalmol.* 2020; 98(2): 177-181.
3. Flodin S., et al. A Modified Harada-Ito Procedure Based on Cyclofusion Ability Improves Surgical Outcome in Individuals with Cyclodeviation. *Submitted manuscript* 2020
4. Flodin S., et al. Measuring health-related quality of life in individuals with cyclodeviation using the Adult Strabismus 20 (AS-20) questionnaire. *J of AAPOS* 2021, doi: 10.1016/j.jaapos.2020.08.011.