Vertical perception after stroke: Anatomy and clinical correlates for visual vertical
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Introduction.– The insula seems to be a crucial zone in the perception of the visual vertical (VV). This has been suggested by a qualitative analysis of the cerebral lesions [1], and has never been statistically confirmed [2]. The aim of this study was to precisely analyze, with modern cerebral imaging, the cerebral area supporting VV perception.

Methods.– VV was assessed in 23 subjects with unique hemisphere stroke (52.9 ± 1 years, 3.7 ± 2 months after stroke) and 27 control subjects (54 ± 9 years). Lesion location and extension were analyzed using MRI (n = 16) or CT scans (n = 7). The lesions were reconstructed onto standardized brain templates. All lesions were mapped using the free MRICro software distribution.

Results.– As expected, a spontaneous contralesional VV tilt (−4.7 ± 4.7; P < 0.001) was found in hemiplegics. VV did not differ between right and left stroke. A correlation was found between lesion extension and the magnitude of VV tilt (r = 0.54; P < 0.01): the longer the extension the more biased the visual vertical towards the contralateral side. The analysis of the cerebral lesions of patients with (n = 14) minus patients without visual vertical bias (n = 9) showed that the most frequently and specifically damaged cerebral region in patients with biased visual vertical was centered on the insula (P < 0.01).

Discussion–Conclusion– The essential role of insula in perception of VV is confirmed. Nevertheless, the absence of right hemispheric dominance, and the influence of lesion extension on VV suggest that verticality representation depends more on the competencies of neural circuits than the properties of a given brain structure, and that VV would partially test verticality representation, given brain structure, and that VV would partially test verticality representation, more specifically than deal with vestibular graviception [3].

References