

Author, year, design	Sample size (n)	Gender	Mean age (y ± SD, range)	Mean education (y ± SD or level)	Location	Assessment measurement tools	Cognition dimensions tested	• Difference between pre- and post-op or against control group	Follow-up (y)
Van Lonkhuizen, 2019, prospective	242	168 F & 74 M	57.2 (23-82)	5th level	101 Left & 113 Right // 142 Frontal & 100 Non-frontal	Central Nervous System Vital Signs tests	Verbal and visual memory, reaction time, complex attention and cognitive flexibility	<ul style="list-style-type: none"> <li>Worsening of SCF, anxiety and depression before and at 1y (p &lt; 0.01) with surgery</li> <li>No difference after surgery</li> </ul>	1
Rijnen, 2019, prospective	261	189 F & 72 M	57.8 ± 11.7 (23-82)	14.0 ± 3.7	106 Left, 124 Right and 31 Bilateral // 154 Frontal and 107 Non-frontal	Central Nervous System Vital Signs tests	Verbal and visual memory, reaction time, complex attention and cognitive flexibility	<ul style="list-style-type: none"> <li>Worsening of verbal memory, visual memory, processing speed, psychomotor speed, reaction time, attention complex and cognitive flexibility with surgery (p&lt;0.05)</li> </ul>	1
Van Nieuwenhuizen, 2019, retrospective	21	14 F & 7 M	55.3 (10.6)	4.0 (1.8) level	13 Convexity, 5 Skull base & 3 Orbital	Central Nervous System Vital Signs tests	Verbal and working memory, attention, executive functioning and cognitive flexibility	<ul style="list-style-type: none"> <li>Significant correlation between preoperative cerebral edema and tumor volume and postoperative cognitive functioning</li> </ul>	0.4
Pranckevičienė, 2019, prospective	93	68 F & 25 M	63.8 +/- 10.7	n.a	36 Left, 37 Right and 20 Bilateral	HVLT-R, EORTC, QLQ-30 and QLQ-BN20	Verbal, working and visual memory and complex attention	<ul style="list-style-type: none"> <li>Worsening of Working memory, Delayed recall and recognition, Flatter learning slope and less effective acquisition compared to control group</li> </ul>	n.a
Van Nieuwenhuizen, 2018, retrospective	20	14 F & 6 M	51.4 (10.9)	4 (6) level	12 Frontal, 4 Parietal, 2 Temporal and 2 Occipital	Central Nervous System Vital Signs tests	Verbal and working memory, attention and executive functioning	<ul style="list-style-type: none"> <li>None</li> </ul>	n.a

<b>Di Cristofori, 2018, prospective</b>	41	15 F & 26 M	74 (70–87)	n.a	7 Skull base, 9 Falx cerebri, 7 Posterior fossa and 18 Convexity	Raven Matrices, Objects and Verbs naming, ideomotor apraxia, Token Test, among others	Verbal and working memory, attention, executive functioning, language	<ul style="list-style-type: none"> <li>Improvement in Language, memory, attention, executive verbal functions, executive non-verbal functions and praxis with surgery (p&lt;0.01)</li> </ul>	1
<b>Zweckberger, 2017, prospective</b>	58	47 F & 11 M	56.4 ± 12.5	n.a	46 Anterior skull base, 5 Middle and 7 Posterior fossa	HVLT-R, EORTC, QLQ-30 and QLQ-BN20	Verbal, working and visual memory, attention, executive functioning, language	<ul style="list-style-type: none"> <li>Improvement of Verbal learning, visual learning memory, Visuomotor processing speed and working memory (p&lt;0.05) with surgery</li> </ul>	1
<b>Hendrix, 2017, prospective</b>	12	7 F & 5 M	62.0 ± 13.2	n.a	1 Left, 5 Right and 6 Bilateral	Central Nervous System Vital Signs tests	Verbal and working memory, attention, executive functioning, language	<ul style="list-style-type: none"> <li>Worsening of Verbal fluency and Perceptual speed compared to control group</li> </ul>	0.17
<b>Abel, 2016, retrospective</b>	70	45 F & 25 M	62.1 ± 12.6	13.5 ± 2.5	23 ventromedial & 47 non-ventromedial prefrontal cortex	Others	Verbal and visual memory, attention and orientation, executive functioning, language skills, cognitive flexibility	<ul style="list-style-type: none"> <li>Worsening of behavior and specifically adaptive functions with surgery</li> </ul>	n.a
<b>Liouta, 2016, prospective</b>	54	38 F & 16 M	56.8 ± 12.8	10.2 ± 2.4	17 Left, 27 Right and 10 Bilateral // 28 Convexity and 26 Skull base	Wechsler Adult Intelligence Scale-III Digit Span, TMT Parts A and B,	Memory, executive functioning, language and cognitive flexibility	<ul style="list-style-type: none"> <li>Verbal deficits more pronounced in the left than right hemisphere</li> <li>No deterioration in neurocognitive function after surgery</li> </ul>	1

						COWAT, RBMT			
<b>Bommakanti, 2016, prospective</b>	57	35 F & 22 M	44.72 (17-64)	n.a	20 Left, 20 Right and 17 Bilateral	Others	Verbal, working and visual memory, attention and executive functioning	<ul style="list-style-type: none"> <li>Worst Memory, attention and executive functions (p: n.a) compared to control group</li> </ul>	0.25
<b>Campanella, 2015, prospective</b>	16	n.a	57.94 ± 11.08	10.81 ± 4.02	9 Left & 7 Right; 6 Frontal, 8 Parietal and 2 Temporal	Central Nervous System Vital Signs tests	Attention and orientation, executive functioning, language and perception.	<ul style="list-style-type: none"> <li>Worsening of Alexithymia and Self-maturity with the surgery</li> </ul>	0.33
<b>Meskal, 2015, prospective</b>	68	46 F & 22 M	55.66 (36-74)	4.90 (4-7) level	30 Left, 33 Right and 5 Bilateral; 39 Frontal & 29 Non-frontal	Central Nervous System Vital Signs tests	Memory, attention, processing speed, executive functioning and cognitive flexibility,	<ul style="list-style-type: none"> <li>Improvement memory, complex attention, cognitive flexibility, processing speed, and executive functioning (p &lt; 0.05) with the surgery</li> </ul>	0.25
<b>van der Vossen, 2014, retrospective</b>	136	106 F & 30 M	59.1 ± 12.7	n.a	66 Convexity and 70 Non-convexity	CFQ and HADS	Cognitive flexibility, anxiety and depression	<ul style="list-style-type: none"> <li>Worsening of cognitive and/or emotional problems in 40% of patients with surgery</li> </ul>	3.0 ± 0.9
<b>Waagemans, 2011, retrospective</b>	89	66 F & 23 M	58.4 ± 13.2	3.8 (2.1) level	37 Left, 25 Right & 27 Bilateral; 45 Convexity & 44 Non-convexity	Others	Working and verbal memory, attention, executive functioning, language and cognitive flexibility	<ul style="list-style-type: none"> <li>Worsening of executive functioning, psychomotor speed, verbal and working memory and information processing capacity (p &lt; 0.05) compared to control group</li> </ul>	1
<b>Krupp, 2009, retrospective</b>	91	60 F & 31 M	56 ± 10 (31-75)	n.a	48 Left & 43 Right; 40 Frontal & 51 Non-frontal	Others	Language and cognitive flexibility	<ul style="list-style-type: none"> <li>Worsening of concentration performance, verbal knowledge, technical ability and word fluency compared to control group</li> </ul>	1.25 ± 0.3

<b>Dijkstra, 2009, retrospective</b>	89	66 F & 23 M	58.6 ± 12.1	3.8 ± 2.2	37 Left, 25 Right and 27 Bilateral	Others	Executive functioning, Psychomotor speed, Working memory, Attention, Information processing and Verbal memory	<ul style="list-style-type: none"> <li>Worsening of executive functioning, verbal memory, information processing capacity, psychomotor speed and working memory (p&lt;0.05) compared to control group</li> </ul>	1
<b>Yoshii, 2008, retrospective</b>	9	n.a	61.8	n.a	4 Left and 5 Right	Central Nervous System Vital Signs tests	Language, attention, executive functioning, memory, and perception	<ul style="list-style-type: none"> <li>Worsening of working memory in left side compared to control group</li> </ul>	n.a
<b>Van Nieuwenhuizen, 2007, retrospective</b>	18	15 F & 3 M	62.6 ± 11.8	n.a	n.a	HVLT-R, EORTC, QLQ-30 and QLQ-BN20	Verbal, working and visual memo, complex attention and language	<ul style="list-style-type: none"> <li>Worsening of memory compared to control group (p &lt; 0.05)</li> </ul>	1
<b>Steinvorth, 2003, prospective</b>	40	27 F & 13 M	55 ± 14	n.a	13 Left, 22 Right and 2 Bilateral	Others	Memory and attention	<ul style="list-style-type: none"> <li>Improvement of attention and memory functions with radiotherapy</li> </ul>	1
<b>Tucha, 2003, prospective</b>	54	37 F & 17 M	57.8 ± 1.5	9.6 ± 0.2	22 Left, 21 Right and 11 Bilateral	Central Nervous System Vital Signs tests	Verbal and visual memory, psychomotor speed, reaction time, complex attention and cognitive flexibility	<ul style="list-style-type: none"> <li>Worsening of working memory and improvement of attentional functions with surgery</li> </ul>	0-33 - 0-75
<b>Tucha, 2001, prospective</b>	33	21 F & 12 M	72.8 ± 0.9	n.a	14 Left, 13 Right & 6 Bilateral; 10 Frontal & 20 Non-frontals	Central Nervous System Vital Signs tests	verbal and visual memory, complex attention, language and cognitive flexibility	<ul style="list-style-type: none"> <li>Improvement of attention and memory functions with surgery</li> <li>Worsening of verbal and figural working memory compared to control group</li> </ul>	0.21 - 0.41

**Supplementary Table.** Detailed description of each cohort (study and patient characteristics). COWAT (Controlled Oral Word Association Test); F (females),

M (males); n.a. (not acknowledged); RBMT (Rivermead Behavioural Memory Test); SD (standard deviation); TMT (Trail making Test); y(years).