

## LOW-CONTRAST ACUITY BEFORE AND AFTER SURGERY IN PATIENTS WITH PITUITARY ADENOMA

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### SUMMARY

**Background:** Pituitary adenomas account for about 10-15% of all surgically and histologically diagnosed intracranial neoplasms. Patients with non-functional pituitary adenomas most frequently demonstrate visual disturbances. The routine neuroophthalmological examination detects most commonly tumor-related loss of visual acuity and visual field or both. Contrast sensitivity (CS) assessment with sine-wave gratings has not been routinely used, but demonstrates a good agreement with low contrast letter chart findings. Recent studies demonstrate that low-contrast Sloan letter charts are the most eligible and often are used in these cases. A special attention is directed to visual function after surgery. Improvement of visual acuity and CS is reported.

**Cases report:** We present the results of a neuroophthalmological examination in two patients with parasellar pituitary adenoma before and after surgery. The twelve months follow-up of visual dysfunction includes standard Snellen visual acuity and Goldmann perimeters as well as low contrast number visual acuity. For the needs of low-contrast testing we choose standard for Bulgaria number charts, administered monocularly at 3% and 1.5% contrast.

**Conclusion:** The presented cases indicate that the low contrast acuity tests in patients with parasellar pituitary adenoma are sensitive indicators just like CS yields information for the visual dysfunction when other visual tests are normal. The loss of low contrast visual acuity improved after surgery as did other visual measures, except in cases with significant low contrast deficit at 1.5% contrast.

**Key words:** pituitary adenoma, low-contrast visual acuity, follow-up

Pituitary adenomas account for about 10-15% of all surgically and histologically diagnosed intracranial neoplasms. They present as secretory or non-secretory tumors and the clinical manifestation varies depending on their location and severity. Patients with non-functional pituitary

adenomas most frequently demonstrate visual disturbances. In general, the routine neuroophthalmological examination detects most often tumor-related loss of visual acuity and visual field or both /3,6,9,14,15/. Numerous studies proving contrast sensitivity /CS/ loss attempt to characterize changes in visual function in patients with pituitary adenoma even before the occurrence of visual acuity and visual fields defects /2,4,5,11/. This CS loss does not correlate with the anatomical measurement of tumors as established by MRI /size and chiasm involvement/ /12/. CS assessment with sine-wave gratings has not been routinely used, but demonstrates a good agreement with low contrast letter chart findings. In particular, these charts have the advantages of simplicity, cheapness and immediate results. Recent studies demonstrate that low-contrast Sloan letter charts are the most eligible and often are used in these cases /13/. A special attention is directed to visual function after surgery. Several investigations report visual and CS improvement after surgical treatment /3,7,8,10,14/.

### CASE REPORTS

We present a neuroophthalmological examination of two patients with parasellar pituitary adenoma before and after surgery over a period of 1 year (tabl.1). The neuroophthalmological follow-up of visual dysfunction before and after surgery includes standard Snellen visual acuity and Goldmann perimeters as well as low contrast number visual acuity. For the needs of low-contrast testing we choose standard for Bulgaria number charts, administered monocularly at 3% and 1.5% contrast. This testing is identical to the measurement of visual acuity at high contrast level. We record not only the attained line of visual acuity test / 0.1; 0.2; 0.3 .../ but the number of optotypes reading not correctly at this line, for example: 0.3 (-1). Our previous investigations show the following "normal" values of low contrast visual acuity: at 3% contrast = 0.5 /-1/ and at 1.5% = 0.4 /-2/.

**Tabl. 1.** Patients' visual function follow-up.

Patient	Periods of investigation	Snellen visual acuity (100% contrast)	Goldmann perimeters	Low contrast visual acuity	
				3%	1.5%
R.H.G.	before surgery	VOD = 1.0 VOS = 1.0	normal	VOD = 0.4 (-2) VOS = 0.3 (-1)	VOD = 0.4 (-1) VOS = 0.2
	1 month after surgery	VOD = 1.0 VOS = 1.0	normal	VOD = 0.5 (-2) VOD = 0.5 (-1)	VOS = 0.5 (-1) VOS = 0.5 (-2)
	6 months after surgery	VOD = 1.0 VOS = 1.0	normal	VOD = 0.5 VOD = 0.5	VOS = 0.5 VOS = 0.5
	12 months after surgery	VOD = 1.0 VOS = 1.0	normal	VOD = 0.5 VOD = 0.5	VOS = 0.5 VOS = 0.5
J.K.R.	before surgery	VOD = 1.0 VOS = 0.6	bitemporal hemianopsia	VOD = 0.4 (-2) VOS = 0.1	VOD = 0.2 (-1) VOS = Ī
	1 month after surgery	VOD = 1.0 VOS = 1.0	normal	VOD = 0.5 (-2) VOS = 0.5 (-2)	VOD = 0.2 (-1) VOS = Ī
	6 months after surgery	VOD = 1.0 VOS = 1.0	normal	VOD = 0.5 VOS = 0.5 (-1)	VOD = 0.2 (-1) VOS = Ī
	12 months after surgery	VOD = 1.0 VOS = 1.0	normal	VOD = 0.5 VOS = 0.5 (-1)	VOD = 0.2 (-1) VOS = Ī

A 59-years old female (R.H.G.) with normal Snellen visual acuity and Goldmann perimeters demonstrated visual loss of 3% and 1.5% low contrast acuity before the surgery and one month later that stayed constant until the end of the first year.

A 45-years old male (J.K.R.) with loss of Snellen visual acuity on the left eye /VOS=0.6/, Goldmann visual field defects /bitemporal hemianopsia/ and visual loss of 3% and 1.5% low contrast acuity before the surgery showed improvement of all vision measures on the first month yet 1.5% low contrast visual acuity deficits remained one year after surgery.

## DISCUSSION

Pituitary adenomas are a significant cause of visual morbidity. Besides the endocrine dysfunction and mass effects with invasion or compression of surrounding neural and vascular structures their clinical expression includes visual and central visual acuity loss as well as visual field defects /3,6,9,15/. The spatial luminance contrast sensitivity function gives a more complete representation of the spatial processing capacity of the visual system than the measurement of the visual acuity at maximum contrast. Patients with pituitary adenomas may not have symptoms of visual disturbances, yet may have early losses of contrast sensitivity. Therefore, it is important to perform CS testing on patients with pituitary adenomas even if they

have no visual complaints /4,11,12/. Because the low-contrast Sloan visual acuity test can make the routine measurement of CS a real possibility, we employed specially modified standards for Bulgarian number test charts at 3% and 1.5% contrast /1,13/.

Several studies discuss pre- and postoperative (transsphenoidal microsurgery) visual function /3,10,14/. Immediate improvement in abnormal central visual acuity and visual fields may occur usually within 2 weeks and may continue for up to 12 months. The CS tests also return to normal after removal of the tumor /7,8/. The low-contrast at 3% and 1.5% contrast was reduced in first patient (R.H.G.) before surgery whereas Snellen visual acuity and Goldmann perimetry were normal. The low-contrast visual acuity improvement was noted on the first month postoperatively and stayed firm until the end of first year after surgery. The low-contrast visual acuity at 3% and especially at 1.5% contrast were abnormal at the two eyes of the second patient (J.K.R.), when Snellen visual acuity was normal at the right eye, abnormal (0.6) at the left eye and Goldmann perimetry showed bitemporal hemianopsia before surgery. Postoperatively Snellen visual acuity at left eye, Goldmann perimetry and low-contrast visual acuity at 3% contrast improved even on the first month after surgery. The significant abnormal low-contrast visual acuity at 1.5% contrast at both eyes before surgery demonstrated no change postoperatively.

In conclusion, the presented cases indicate that low-contrast acuity tests in patients with parasellar pituitary adenoma are sensitive indicators just like CS yields information for the visual dysfunction when other

visual tests are normal. The loss of low-contrast visual acuity improves after surgery as do other visual measures, except in cases of significant low-contrast deficit at 1.5% contrast.

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