Video-endoscope versus endoscope for paranasal sinus surgery: influence on visual acuity and color discrimination

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Endoscopic and video-endoscopic visual acuity and color discrimination were investigated using a standard disk for testing visual acuity and a color discrimination test. A 1-chip-CCD-Camera (CCC) or 3-chip-CCD-Camera plus digital image processing (digivideo) on the endoscope and a 15 inch high resolution video monitor were used. Color discrimination was investigated by comparing the ability to sort colored disks of low chromatic saturation (desaturated Panel D-15 Test), ranging from yellow to red, under direct vision or via monitor using the same 1-CCC- and 3-CCC-system. Visual acuity deteriorated by 1.58 +/- 0.16 steps (+/- SEM) for the 1-CCC and 1.21 +/- 0.16 steps for the 3-CCC plus digivideo compared to vision through the endoscope (p < 0.001 and p < 0.001). Visual acuity was significantly better for the 3-CCC-video-endoscope compared to the 1-CCC-video-endoscope (p = 0.0045). The difference in color discrimination between the naked eye and the 1-CCC-monitor system was not significant. More mistakes were made with the 3-CCC-monitor system. The impairment of image quality with the video endoscope, which is experienced by many surgeons, is reflected in a marked loss of visual acuity in our experiments. Sharpness and contrast of the video image are significantly enhanced by the 3-CCC plus digital image processing, compared to the 1-CCC. Color discrimination, however, was not impaired by the 1-CCC, indicating that color perception with the video-endoscope can be very good and may not contribute significantly to the loss of image quality.