# Indocyanine green videoangiography for hemangioblastoma

## Indocyanine green videoangiography for brainstem hemangioblastoma

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## Indocyanine green videoangiography for cerebellar hemangioblastoma

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## Indocyanine green videoangiography for spinal cord hemangioblastoma

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Indocyanine green videoangiography with FLOW 800 seems to be a useful method to monitor blood flow in the exposed vessels and parenchyma during the microsurgical removal of CNS tumors in selected cases. In particular, a pre resection survey provides useful information about pathophysiological changes of brain vasculature related to the tumor and aids in the individuation of helpful landmarks for the surgical approach, and the postresection survey helps to prevent potential complications associated with the resection (such as local hypoperfusion or venous infarction) [1].

## Case series

Twenty intraoperative ICG videoangiography procedures were performed in 12 patients with hemangioblastomas. Seven lesions were located in the cerebellum, two lesions were in the medulla oblongata, and three lesions were in the spinal cord.

Ten procedures were performed before or during dissection, and 10 procedures were performed after tumor resection. ICG videoangiography could provide dynamic images of blood flow in the tumor and its related vessels under surgical view. Interpretation of these dynamic images of tumor blood flow was useful for discrimination of transit feeders (feeders en passage) and also for estimation of unexposed feeders covered with brain parenchyma. Postresection ICG videoangiography could confirm complete tumor resection and normalized blood flow in surrounding vessels.

In surgery for hemangioblastomas, careful interpretation of dynamic ICG images can provide useful information on transit feeders and unexposed hidden vessels that cannot be directly visualized by ICG [2)].

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From January 2009 to February 2012, nine consecutive patients (seven men, two women) who underwent surgery for hemangioblastomas using intraoperative ICG-VA were included in this study. Surgery was performed on four cystic cerebellar lesions with mural nodules, two solid tumors (one in the cerebellar hemisphere and one in the medulla oblongata), one spinal tumor and multiple tumors in two patients with von Hippel-Lindau disease. Of the nine patients, three were treated for recurrent tumor. The ICG-induced fluorescence images of hemangioblastomas with variable presentation were evaluated.

All tumors could be completely removed en bloc. Blood flow in the tumor and tumor-related vessels at the brain surface were clearly detected by ICG-VA in all cases, except one recurrent tumor where postoperative adhesive scar tissue obstructed ICG-induced fluorescence resulting in poor delineation of the blood flow patterns and tumor margins. ICG-VA was also helpful for detecting the multiple small mural nodules within the cyst or the tumors buried under thin gliotic neural tissue despite reduced fluorescence.

Intraoperative ICG-VA is a safe and easy modality for confirming the vascular flow patterns in hemangioblastomas. In addition, ICG-VA provided useful information for intracystic small lesions or lesions concealed under thin brain tissue in order to accomplish total resection of these tumors [3)].

# Case reports

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Cerebellar HB was detected in three patients presenting with symptoms of vertigo and/or headaches and diagnosed on the basis of preoperative magnetic resonance imaging (MRI) and cerebral angiographic findings. Preoperative embolization of the tumor feeding artery was not performed in any of the patients. None of the patients underwent any procedure prior to ICGVAG that would affect the ICG findings, such as perilesional hemostatic coagulation or ablation. In each patient, it was possible to judge the approximate location of the tumor in relation to the brain surface and to distinguish the feeding and draining vessels. Following resection of the tumor, ICGVAG images confirmed that the mural nodule had been eliminated. None of the patients required blood transfusion, either during or after the surgery. For each patient, the lesion was pathologically confirmed as HB, postoperative contrast-enhanced MRI confirmed the absence of residual tumor, and diffusion-weighted MRI revealed no ischemic changes.

Differentiation of feeding and draining vessels in the region of the lesion is particularly important for successful surgical removal of HB. In the present three patients, ICGVAG findings enabled easy vascular differentiation and were also useful for confirming that there was no residual tumor. Indocyanin green videoangiography was concluded to be useful for safe resection of HB [5].

# References


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