Usefulness of Intraoperative Indocyanine Green Videoangiography for Four Spinal Hemangioblastomas

Tomohiro Murakami MD, PhD; Izumi Koyanagi; Takahisa Kaneko MD; Satoshi Ookawa MD; Nobuhiro Mikuni

Dept. of Neurosurgery, Sapporo Medical University School of Medicine, ***Sapporo Hokkaido JAPAN***

Introduction

Spinal hemangioblastomas are highly vascular intramedullary tumors and should be removed en block after coagulation of feeding arteries. It is important to identify the difference between feeders and normal vessels. We retrospectively analysed the usefulness of intraoperartive ICG videoangiography for spinal hemangioblastomas.videoangiography for spinal hemangioblastomas.

Methods

Four spinal hemangioblastomas (2 in cervical associated with von Hippel-Lindau syndrome, 2 in thoracic) were performed hemilaminectomy in prone position, Both after opening dura and removal of tumor, ICG (5mg) was injected intravenously.

Results

The ICG angiography clearly demonstrated feeding and draining vessels and the location of intramedullary tumor. Moreover normal spinal cord vessels were indentified easily. Total removal of the tumors and preservation of normal blood supply of the spinal cord were performed safely in all cases. The cervical case associated with von Hippel-Lindau syndrome had temporary mild motor weakness of left hand and dysesthesia and improved 1 weeks after surgery.

Table 1

Table 1: Summary of cases

Case	Age, Sex	Level	MR images			Syringomyelia
			T1WI	T2WI	T1Gd	
Case 1	42, M	Th7/8	iso	mild hyper	homogenous	holocord
Case 2	77, F	Th10/11	iso	mild hyper	homogenous	Th6-conus
Case 3 (VHL)	25, F	C4	iso	mild hyper	homogenous	holocord
		C5	iso	mild hyper	homogenous	

VHL, von Hippel-Lindau; M, man; F, female; Th, thoracic; C, cervical

Figure 1

Fig.1: Intraoperative photographies of Case. A: Intraoperative photography showing the vascular tumor with many dilated vessels on the dorsal surface of the spinal cord. Rostral is to the left. B and C: ICG videoangiography demonstrating a feeding artery (white arrow) and opacification of the tumor in the early phase (B). The late phase shows the tumor and tortuous drainig veins (C). D: After removal of tumor, intraoperative photography showing tumor cavity and normalization of red veins. E: ICG videoangiography demonstrating tortuous veins without enhanced tumor.

Conclusions

Intraoperative ICG videoangiography for spinal hemangiblastomas was useful because of providing information not only difference from feeding arteries and normal spinal cord vessels but also the location of the tumors. Moreover this is a less invasive and easy technical method on the intraoperative diagnosis.

Figure 2

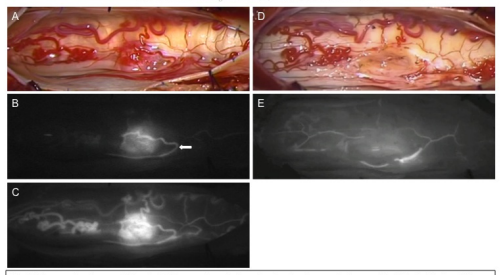

Fig.2: Intraoperative images of Case 2. A: Intraoperative photography showing the vascular tumor with dilated red veins at the right posterior root exit zone of the spinal cord. Rostral is to the left. B and C: ICG videoangiography demonstrating a feeding artery (white arrow) and subpial tumor enhanced in the early phase (B). The late phase shows the tumor and tortuous draining veins (C). D: After removal of tumor, intraoperative photography showing tumor cavity and loss of some posterior roots. E: ICG videoangiography demonstrating normalization of blood circulation without enhanced tumor.

Figure 3

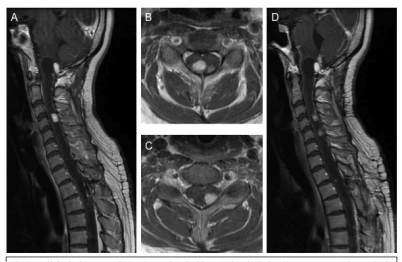

Fig.3: Radiological images of Case 3 associated with von Hippel-Lindau disease. Preoperative sagittal (A and D) and axial (B and C) T1-weighted MR imaging after gadolinium administration demonstrating homogenously enhanced tumor of the dorsal of the spianl cord at the C4 level (B) and C5 level (C) with holocord syringomyelia.

Figure 4

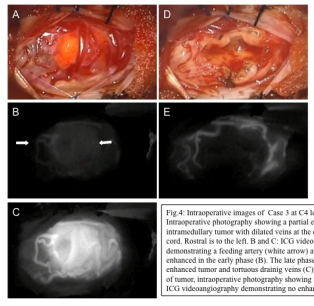

Fig.4: Intraoperative images of Case 3 at C4 level. A: Intraoperative photography showing a partial exophytic intramedullary tumor with dilated veins at the dorsal of the spinal cord. Rostral is to the left. B and C: ICG videoangiography demonstrating a feeding artery (white arrow) and subpial tumor enhanced in the early phase (B). The late phase showing the enhanced tumor and tortuous drainig veins (C). D: After removal of tumor, intraoperative photography showing tumor cavity. E: ICG videoangiography demonstrating no enhanced tumor.

Figure 5

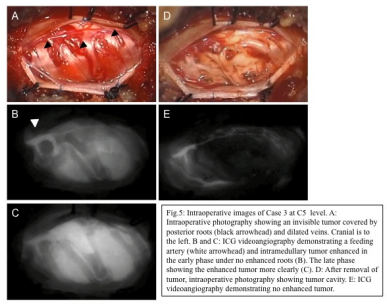

Fig.5: Intraoperative images of Case 3 at C5 level. A: Intraoperative photography showing an invisible tumor covered by posterior roots (black arrowhead) and dilated veins. Cranial is to the left. B and C: ICG videoangiography demonstrating a feeding artery (white arrowhead) and intramedullary tumor enhanced in the early phase under no enhanced roots (B). The late phase showing the enhanced tumor more clearly (C). D: After removal of tumor, intraoperative photography showing tumor cavity. E: ICG videoangiography demonstrating no enhanced tumor.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of identification of the feeding arteries using ICG videoangiography 2) Discuss, in small groups, the technique of removal of spinal hemangiblastoma