

# Usefulness of 3-dimensional printed models in clipping intracranial aneurysms via keyhole approaches: a randomized controlled study

Name: Sung Ho Lee, MD, PhD<sup>1</sup>, Young Hoon Choi, MD<sup>1</sup>, Young Sill Kang, MD<sup>1</sup>, Hansan Oh, MD, PhD<sup>2</sup>, Hee Chang Lee, MD<sup>1</sup>, Jina Park,<sup>3</sup> Jeong Eun Kim, MD, PhD<sup>1</sup>, Sang Joon Park, PhD<sup>4</sup>, Min Park, AS<sup>4</sup> Chul-Kee Park, MD, PhD<sup>1</sup>, Won-Sang Cho, MD, PhD<sup>1</sup>.

Affiliation: <sup>1</sup>Department of Neurosurgery, Seoul National University Hospital, Seoul National University College of Medicine, Seoul, Korea; <sup>2</sup>Department of Neurosurgery, Gil Medical Center, Gachon University College of Medicine, Incheon, Republic of Korea. <sup>3</sup>College of Nursing, Seoul National University, Seoul, Korea; <sup>4</sup>MEDICAL IP Co. Ltd., Seoul, Korea

## Purpose:

The present study aimed to evaluate the clinical and educational efficacy of three-dimensional (3D) printed models in surgical clipping of intracranial aneurysms (IAs).

## Methods:

A single-center, randomized, controlled study was conducted for patients with one unruptured IA was clipped via a keyhole approach using a 3D printed model at a 1:1 scale between September 2021 and August 2022. A total of 28 patients were enrolled (n=13 in the case group, n=15 in the control). The usefulness of the model was determined based on treatment outcomes, patient counseling, and physician education.

## Results:

# 7th Bi-Neurovascular Symposium

September 22-23, 2023 / SIGNIEL, Busan, Korea



Bi-Neurovascular Symposium



Compared to the control group, the total operation time was shorter (median 91 minutes versus 125 minutes;  $P = 0.02$ ) and the volume of blood loss was lower (median 119.6 ml versus 234.0 ml;  $P = 0.01$ ) in the case group. Patients' understanding of the operation improved significantly after counseling using 3D printed models in all aspects ( $P \leq 0.02$ ). Although they failed to achieve a high rate of selecting a proper type of keyhole craniotomy, trainees subjectively considered that the 3D printed models were helpful.

## **Conclusions:**

The 3D-printed IA models were useful in improving the treatment outcomes, patient satisfaction with the preoperative counseling, and education of the surgical trainees.