



### Introduction

Previous surgical guidelines for brain contusions are based primarily on imaging and clinical features due to the lower use of intracranial pressure (ICP) monitoring. Whether ICP-guided brain contusion treatment is more favorable than that based on imaging and clinical features remains unknown. We evaluated the effects of a management protocol based on the use of ICP monitoring on functional outcomes in patients with brain contusions.

### Methods

A retrospective cohort study based on two databases was conducted. The patients for brain contusion with volume great than 20ml were included into this study. According to the clinical experience and judgment of the attending physician, patients enrolled in the study were divided into two groups (ICP-monitoring group and imaging–clinical examination group). Patients in the ICP-monitoring group were given immediate ICP monitoring. According to the specific value of ICP and the control situation, the follow-up treatment was determined. In the imaging–clinical examination group, patients were given immediate brain contusion evacuation with or without decompressive craniectomy (DC). ICP monitoring was or was not administered after surgery. A propensity score matching was used to compare the 6-month favorable outcome and prevalence of complications between the two groups.

### Results

After adjusting for other risk factors (compression of basal cistern, volume of brain contusions, and multiple contusions), we found that the initial ICP was significantly associated with neurological deterioration (odds ratio [OR], 1.24; 95% confidence interval [CI], 1.17–1.32;  $P < 0.001$ ), and nonlinear correlation (cubic spline functions) achieved the best fit ( $R^2 = 0.547$ ). Since the initial ICP was  $> 15$  mmHg, the risk of neurological deterioration increases significantly with the increase in initial ICP. After propensity score matching, the six-month favorable outcome rate was 69.2% in the ICP-monitoring group compared with 58.2% in the imaging–clinical examination group (OR, 1.61; 95% CI, 1.10–2.35;  $P = 0.013$ ). The six-month good recovery rate was 35.0% in the ICP-monitoring group as compared with 18.1% in the imaging–clinical examination group (OR, 2.43; 95% CI, 1.59 to 3.72;  $P < 0.001$ ). CSF drainage increased from 15.6% in the imaging–clinical examination group to 44.7% in the ICP-monitoring group (OR, 0.23; 95% CI, 0.15–0.35;  $P < 0.001$ ), but the mild hyperosmolar therapy decreased from 72.6% in the imaging–clinical examination group to 47.7% in the ICP-monitoring group (OR, 2.90; 95% CI, 1.98–4.26;  $P < 0.001$ ) and enhanced hyperosmolar therapy decreased from 38.0% to 19.0% (OR, 2.61; 95% CI, 1.72–3.97;  $P < 0.001$ ). The incidence of acute renal failure (1.3% vs. 5.1%,  $P = 0.036$ ) and sepsis (2.5% vs. 7.6%,  $P = 0.012$ ) in the ICP-monitoring group was significantly lower than that in the imaging–clinical examination group.

### Conclusions

For patients with a volume of brain contusion of  $> 20$  mL, care focused on the management protocol based on ICP monitoring was shown to be superior to care based on imaging and clinical examination. The surgical treatment of brain contusion based on ICP monitoring may improve the prognosis of patients.

### Learning Objectives

To evaluate the effects of a management protocol based on the use of ICP monitoring on functional outcomes in patients with brain contusions.

