Hemorrhage after stereotactic brain biopsy

Hemorrhage of the surgical trajectory and surgical bed of a stereotactic brain biopsy (SBB) is clinically seen in 0.3%-8.6% of all cases, depending on the methodology chosen ^{1) 2) 3) 4)}.

Achieving hemostasis requires an open craniotomy in 0.8%-2,7% of all patients ^{5) 6)}

In the case of SB in eloquent areas, minimizing the risk of complication is important, since even a minor hemorrhage can have devastating consequences for the patient ⁷⁾.

One of the most serious complications of stereotactic biopsy is postoperative symptomatic hemorrhage due to injury to the basal perforating vessels such as the lenticulostriate arteries neighboring the basal ganglia lesions.

Treatment

There is no gold standard concerning its intraoperative management. Traditionally, treatment of intraoperative bleeding during SBB includes irrigation with temperate saline solution through the biopsy cannula, favorable positioning of the headrest of the surgical table, and controlled intraoperative systemic hypotension.

Intraoperative management of profuse arterial bleeding may be challenging during SBBs. The limited working channel and absence of direct visualization of the bleeding vessel often lead many neurosurgeons to convert the procedure to open craniotomy and coagulate the vessel under microscopic visualization and/or evacuate the associated hematoma⁸⁾.

Some authors have described percutaneous techniques based on on-site compression or the use of hemostatic agents with favorable results $^{9(10)(11)}$.

Preliminary results suggest that the thrombin-gelatin matrix injection is a simple, safe and effective stereotactic practice to manage persistent surgical bed bleeding that cannot be arrested by standard, conventional hemostatic methods ¹²

Prevention

A new target-planning method was proposed by Sato et al. from the Kitasato University School of Medicine, Sagamihara, University of Yamanashi Faculty of Medicine, Chuo, Japan, to reduce hemorrhagic complications by avoiding injury to the perforating arteries.

Three-dimensional 3-T Time-of-flight magnetic resonance angiography (3D 3-T TOF) imaging was applied to delineate the basal perforating arteries such as the lenticulostriate arteries. The incidence of postoperative hemorrhage in basal ganglia cases was compared between a new method using 3D 3-T TOF and a conventional target-planning method based on contrast-enhanced T1-weighted magnetic resonance images obtained by 1.5-T scanning.

3D 3-T TOF imaging could delineate the basal perforating arteries sufficiently in target planning. No

postoperative hemorrhage occurred with the new method (n = 10), while 6 postoperative hemorrhages occurred with the conventional method (n = 14). The new method significantly reduced the occurrence of postoperative hemorrhages (p = 0.017).

3D 3-T TOF MR imaging with contrast medium administration provides useful information about the perforating arteries and allows safe stereotactic biopsy of basal ganglia lesions ¹³.

1) 5)

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