

A univariate logistic regression analysis revealed that left CI and older age were significant predictors of AP, whereas sex, CI type, or diabetes mellitus were not significant predictors of AP (Table 2).

We tested several regression models to assess the relation between the laterality of CI and the risk of AP. Left hemispheric CI was associated with increased odds of AP after adjusting for age, sex, CI type, or diabetes mellitus. Older age remained significant in the adjusted model (models 1-4, Table 2).

Furthermore, we investigated the relationship between the frequency of complications after CI and the laterality and location of CI. All AP cases occurred in patients with stroke from the motor cortex to the internal capsule, regardless of laterality. Moreover, the frequency of dysphagia as a direct cause of AP did not differ according to laterality, whereas the frequency of AP that ensued from dysphagia in the left CI group was greater than that observed in the right CI group. AP was present in 25.8% of cases in the group with left CI from the motor cortex to the internal capsule complicated by dysphagia (Table 3).

Table 3. Frequency of complications after cerebral infarction from the motor cortex to the internal capsule classified according to laterality

Location of the cerebral infarction	Right cerebral infarction from the motor cortex to the internal capsule (n=39)	Left cerebral infarction from the motor cortex to the internal capsule (n=44)	p value
Complication 1			
Dysphagia	23 (59.0)	31 (70.5)	0.357
Non dysphagia	16 (41.0)	13 (39.5)	
Complication 2 #			
Aspiration pneumonia	1 (4.3)	8 (25.8)	0.024
Non aspiration pneumonia	22 (95.7)	23 (74.2)	

Data are n (%).

Complication 2 consisted of patients with the complication of dysphagia.

Discussion

In the present study, we first demonstrated that left CI was strongly associated with an increased risk of AP. This association was independent of age, sex, CI type, or diabetes mellitus complication. In addition, as all patients with AP in this report exhibited corticobulbar tract infarction and dysphagia, AP was caused by dysphagia resulting from disturbances in the corticobulbar tract. Although the frequency of dysphagia after CI did not differ according to the laterality of CI, the frequency of AP after CI did. This result might indicate that the grade of dysphagia was affected by the laterality of CI.

Although the reason underlying the higher risk of AP observed in patients with left CI remains unclear, several mechanisms have been proposed and debated⁹. AP is generally considered to be caused by a decrease in the swallowing reflex: oral bacteria flow into the lungs with sputum, or stomach contents flow into the lungs backwardly. The cycle of swallowing consists of 3 phases: the oral phase, the pharyngeal phase, and the esophageal phase. The upper central nervous system adjusts the beginning of swallowing and facilitates the voluntary oral phase to reflexive pharyngeal phase⁶. Although some evidence suggests that the prepharyngeal stages of swallowing are

commanded by the bilateral cortical regions, the degree of hemispheric symmetry has not been established⁷⁻⁹⁾. Recent reports using functional MRI, positron emission tomography (PET), and magnetoencephalography supported preferential left hemispheric activation during swallowing¹⁰⁻¹²⁾.

Taking these observations into account, we concluded on the existence of an asymmetry in descending corticobulbar projections that are relevant for swallowing efficacy, ie, left hemispheric dominance.

In the present study, we found that CI in the left hemisphere increases the risk of AP. In particular, the group with left CI from the motor cortex to the internal capsule complicated by dysphagia was at high risk for AP.

Our study might have some promising effect; preventive measures against AP, such as mouth care and maintenance of posture, may be worth being taken in such patients, starting soon after admission, nevertheless our research is small¹³⁻¹⁵⁾. Larger trial with more patients with AP after CI is needed to better investigate this effect.

References

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