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Objective

Videofluoroscopic swallowing study (VFSS) is regarded as a gold standard for objective assessment of swallowing physiology and aspiration risk. However, study-related aspiration risk exists, especially in patients with reduced arousal and limited airway-protective responses. Therefore, we aimed to investigate the **association between consciousness level and swallowing function** in patients with disorders of consciousness after stroke, and to derive **Coma Recovery Scale–Revised (CRS-R) cut-off values** for aspiration risk on VFSS.

Methods

This single-center, retrospective observational study included adult patients (≥ 18 years) with stroke (ICD-10 I60–I64) who underwent the CRS-R and VFSS within 5 days of each other and had a stroke onset within the prior 2 years. Patients were excluded if they were classified as emerging from the minimally conscious state (eMCS). The primary outcome was **aspiration on VFSS finding**, and secondary outcomes were semisolid aspiration and silent aspiration. Associations of CRS-R total and subscale scores with aspiration risk were examined using **univariate and multivariable logistic regression models** adjusted for age, sex, body mass index, and tracheostomy status. Optimal CRS-R cut-off values for predicting aspiration risk were determined using the **Youden index** based on univariate models.

Results

Of 6,505 stroke admissions (January 2011–December 2024), 251 patients met inclusion criteria (mean age 61.6 ± 14.6 years; 51.4% male). Occurrence of aspiration differed across consciousness categories, with the **highest rates in VS/UWS and the lowest in MCS+** ($\chi^2=17.1$, $df=6$, $p=0.009$). Higher CRS-R total score was associated with lower odds of aspiration in univariate analysis (OR 0.88, 95% CI 0.82–0.94; $p<0.001$) and after adjustment (aOR 0.85, 95% CI 0.79–0.92; $p<0.001$). Similar inverse associations were observed for semisolid aspiration (aOR 0.91, 95% CI 0.85–0.98; $p=0.009$) and silent aspiration (aOR 0.88, 95% CI 0.82–0.95; $p<0.001$). Youden index–derived CRS-R total score **cut-offs were 13.5 for aspiration, 9.5 for semisolid aspiration, and 8.5 for silent aspiration.**

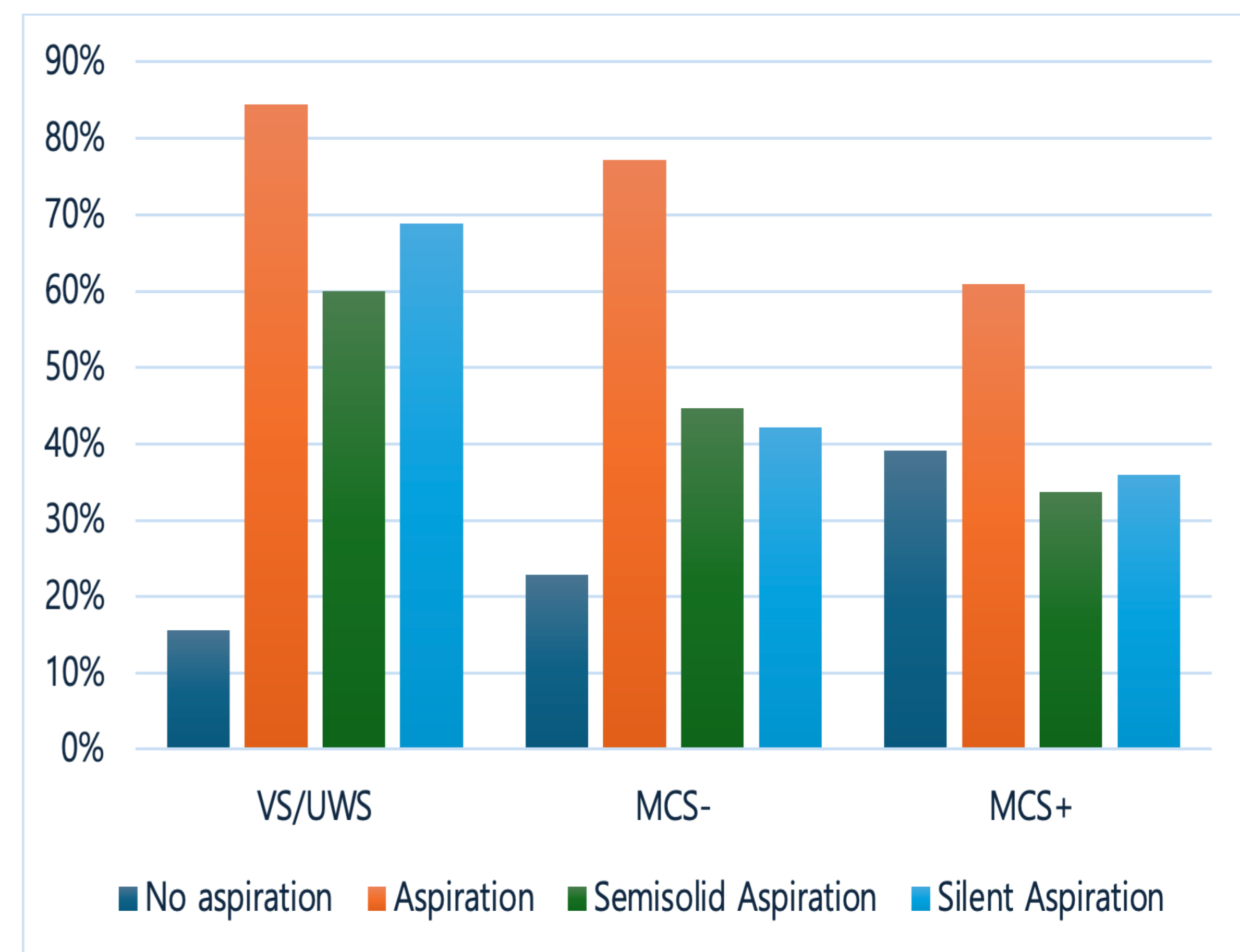


Figure 1. VFSS outcomes by level of consciousness (VS/UWS, MCS–, MCS+).

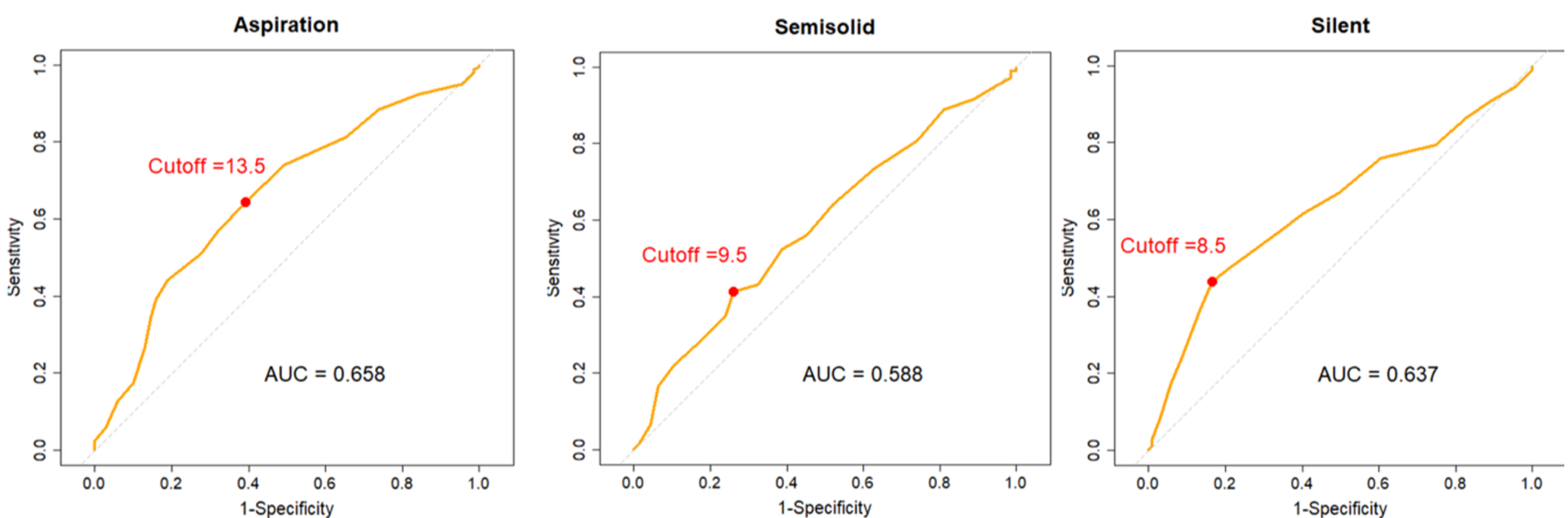


Figure 2. Youden index–derived cut-off values of CRS-R total score for VFSS outcomes from univariate models. (A) aspiration, (B) semisolid aspiration, and (C) silent aspiration.

Conclusion

In our results, patients with stroke and disorders of consciousness were at an increased risk of aspiration and **lower CRS-R scores were significantly associated with an increased aspiration risk on VFSS findings**. CRS-R cut-offs derived via the Youden index may support pre-VFSS risk stratification and more tailored rehabilitation planning to reduce unnecessary procedural exposure in high-risk patients.

Acknowledgement

This study was supported by a National Research Foundation of Korea (NRF) grant funded by the Korean government (MSIT) (RS-2024-00337352).