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Characteristics of cervical alignment and hyoid bone location in the anterior cervical surgical position with neck pillow

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Background: In anterior cervical spine surgery, it is important to focus on cervical alignment and hyoid bone position in the operative posture.

Design: A retrospective study.

Objective: The purpose of this study was to investigate the characteristics of cervical alignment and hyoid bone position in the anterior cervical surgical position with neck pillow.

Methods: The subjects were 77 cases (age 65.4 y.o., M54:F23) who underwent anterior cervical spine surgery. Under three different neck positions (①preoperative neutral position, ②preoperative extension position and ③surgical position with neck pillow), O-C2 angle, C2-7 angle and hyoid bone location were assessed and statistically compared. The hyoid bone location was defined as b/a (a: C3 vertebral body height, b: distance from the upper C3 vertebral body to the intersection of the perpendicular line from the hyoid bone).

Results: Statistically significant differences ($P < 0.05$) were found for O-C2 angle (① 23.3 ± 14.2 , ② 37.8 ± 11.3 , ③ 27.3 ± 8.8), C2-7 angle (① 4.7 ± 18.0 , ② 17.9 ± 16.9 , ③ 20.8 ± 11.6) and hyoid bone location (① 1.7 ± 1.0 , ② 0.87 ± 0.88 , ③ 2.05 ± 0.6), respectively. The coefficient of variation for the C2-7 angle was ①3.85, ②0.94 and ③0.56. The hyoid bone location showed a negative correlation with O-C2 angle (① $r = -0.7$, ② $r = -0.64$, ③ $r = -0.6$) and a positive correlation with C2-7 angle (① $r = 0.62$, ② $r = 0.4$, ③ $r = 0.38$) (all $P < 0.01$).

Discussion: The results of this study suggest that the hyoid bone is raised by extension of the upper cervical spine via the suprahyoid muscles traction and lowered by lordosis of the subaxial cervical spine via the infrahyoid muscles. The surgical position with neck pillow provides a subaxial cervical lordosis with little variation avoiding hyperextension of the upper cervical spine. However, the hyoid bone goes down in surgical position than any preoperative upright positions, so a surgeon should pay attention on the hyoid bone location when approaching to C3/4 or above levels.

Fig. 1

