

Double insurance C1-2 fixation using an aiming device and an intraoperative CT navigation system

Background: Double insurance C1-2 fixation, a combination of Magerl screw and C1 lateral mass screw (LMS), was published by Goel in 2007. However, despite its very strong fixation with a 100% fusion rate, it has not been widely adopted. Perhaps one of the reasons for this unpopularity is the difficulty of inserting two screws into the small C1 lateral mass.

Research question: Is it possible to facilitate double insurance C1-2 fixation with high-tech devices?

Methods: We present our double insurance technique using an aiming device for the Magerl screw and an intraoperative CT navigation system for the C1 LMS. The guide wire for the Magerl screw is inserted with our original aiming device. We check the position of the guide wire using intraoperative CT and simultaneously transfer the image data to a navigation system. The C1 LMS is then inserted avoiding the guide wire under navigation. The Magerl screw is then inserted after drilling and tapping along the guide wire.

Results: Seven patients were successfully treated with this method, six bilaterally

and one unilaterally. C1 arch resection was performed in 5 patients. In all cases, two screws were successfully inserted into the lateral mass of C1. There were no VA injuries and the fusion rate was 100% in 4 patients with more than 1 year of follow-up.

Discussion: Our method provides rigid and secure C1-2 fixation. The strong fixation provided by the double insurance method may be able to avoid unnecessary O-C fusion. This method may be most suitable for C1-2 fixation with resection of the posterior C1 arch, where the bone bed for bone grafting is very small.

