

Abstract:**Title:**

3D Navigation is useful for posterior cervical foraminotomy, especially of the lower cervical spine

Background:

Unilateral monosegmental radiculopathy, caused by foraminal soft disc nerve root compression, can be safely and effectively treated with posterior cervical foraminotomy (PCF). Intraoperative fluoroscopy is the most widely used method for level localization. However, the error rate increases, especially in obese patients and the lower cervical spine.

Research question:

Are there level-dependent differences in complications when using 3D navigation?

Design:

Single-center retrospective cohort study

Methods:

In this retrospective observational study, we analyzed a total of 45 patients (mean age 54 ± 9 years, mean BMI 29 ± 7 , 22 females and 23 males) who underwent PCF using intraoperative 3D navigation between 08/2017 and 04/2022. Two-tailed t-tests were used for simple difference comparison of preoperative, postoperative and follow-up (FU, 48 ± 28 days) values for neck pain (visual analogue scale, VAS), radicular pain (VAS) and paresis (muscle strength according to Janda). The same was done for level-dependent group comparisons by dividing the group according to the location of disc herniation (C2-C6 and C6-T1).

Results:

A significant neck and radicular pain reduction was achieved postoperatively (both $p < .0001$) and during FU (both $p < .0001$). Similarly, significant improvement of the paresis was reached postoperatively ($p < .0001$) and during FU ($p < .001$). 81,3 % of the patients had an intraoperative blood loss of less than 100 ml. Mean time of surgery was 92 minutes (± 28) with 6 days (± 3) as the mean length of stay. There were no significant group differences between upper (C3-C6) and lower (C6-T1) cervical spine concerning symptom relief (all $p > .05$). All surgery levels were identified correctly. Anterior revision surgery was performed in 3 patients because disc herniation could not be completely removed from dorsal.

Discussion:

Intraoperative 3D navigation was successfully used for PCF in our patient cohort, resulting in significant symptom relief. Especially during procedures on the lower cervical spine and cervicothoracic junction, 3D navigation simplified orientation and thus ensures an equivalent outcome as on the upper cervical spine.