

Title

The application of three-dimensional printed patient-specific drilling templates for expansive open-door laminoplasty: a single-center, prospective randomized controlled study

Objective

To validate the efficacy of three-dimensional (3D) printed patient-specific drilling templates with the function of locating and depth control for expansive open-door laminoplasty (EOLP).

Methods

A single-center, prospective randomized controlled study was conducted on the patients who underwent unilateral EOLP from August 2019 to December 2020. The 3D printed patient-specific drilling template was used in the template group. All the EOLP were performed by a senior surgeon and a junior surgeon.

Results

37 patients with 12-month follow-up were analyzed. The VAS scores were significantly lower in the template group at 12 months postoperatively ($P<0.05$). The anteroposterior diameter, Pavlov's ratio and Open angle were all higher in the template group than those in the control group at 3 days and 12 months postoperatively ($P<0.05$). The satisfaction of the trough position on both sides and incomplete fracture rate on the hinge side were higher in the template group based on the CT scans taken 3 days after surgery ($P<0.05$). To the junior surgeon, the satisfaction and the incomplete fracture rate were significantly higher in the template group compared with those in the control group ($P<0.05$).

Conclusion

The application of 3D printed patient-specific drilling templates with the function of locating and depth control for EOLP could improve the outcome of neck pain relief and expand the decompression. It can also improve the satisfaction of the trough position on the open-door side and the hinge side and decrease the complete fracture rate on the hinge side, especially for the junior surgeon.