Percutaneous navigated transpedicular instrumentation in subaxial cervical spine: early single-center experience

Introduction

Transpedicular (TPD) screw placement in cervical spine is a demanding procedure biomechanically superior to massa lateralis screws. The advent of intraoperative 3D imaging with neuronavigation (NN) established the safe use of TPD trajectory in cervical spine. In various cases there is no dorsal decompression needed, in our consideration these patients are well suitable for a minimal invasive approach. In our initial single-center study we report our initial experience with percutaneous approach for TPD screw placement.

Methods

Inclusion criteria for the study was the indication for dorsal cervical instrumentation without need for decompression e.g., after ventral surgery. We use the pronation position with the head fixed in carbon Mayfield on which the navigation reference is also attached. In lower cervical spine the reference frame is fixed on the spinous process. We carry out a reference scan with mobile intraoperative 3D-imaging device, navigate the soft tissue dilatation through a small skin incision and pre-drill in the planned TPD trajectory into which we insert Kirschner wire. We perform a control 3D scan followed by navigated implantation of the cannulated screws. The final assessment with implanted rods is then performed by an intraoperative 3D scan.

Results

Our actual cohort contains 6 cases with 32 percutaneously implanted TPD screws in subaxial cervical spine. There was no neurovascular injury. Navigation accuracy when comparing screenshots of the planned screw trajectory during pre-drilling and the real position of the Kirschner wire and the screws from the intraoperative 3D scan was in all cases <1mm. Patients were discharged on the 2nd postoperative day. An outpatient check-up with a radiograph was performed 6 and 12 weeks after the surgery when we were able to state intact implanted construct and unproblematic wound healing.

Conclusion

We state the safety and benefit of percutaneous implantation of TPD screws in subaxial cervical spine. Intraoperative 3D-imaging with neuronavigation is enabling safer procedure with less tissue exposition. Due to superior biomechanical nature of TPD trajectory there is legitimate consideration about lowering the number of involved levels.