Radiation doses of sliding gantry CT-based as compared to mobile cone-beam CT-based navigated pedicle screw placement in a homogenous cohort

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Background

For the present study, we compared the applied radiation doses of operating room-based sliding gantry CT-based (ORCT) and mobile cone-beam CT-based (CBCT) pedicle screw placement for spinal instrumentation.

Methods

We analyzed 183 and 54 patients who underwent ORCT-based using an automated radiation dose adjustment or standard CBCT-based pedicle screw placement for spinal instrumentation at our department between 06/2019 and 01/2020, respectively.

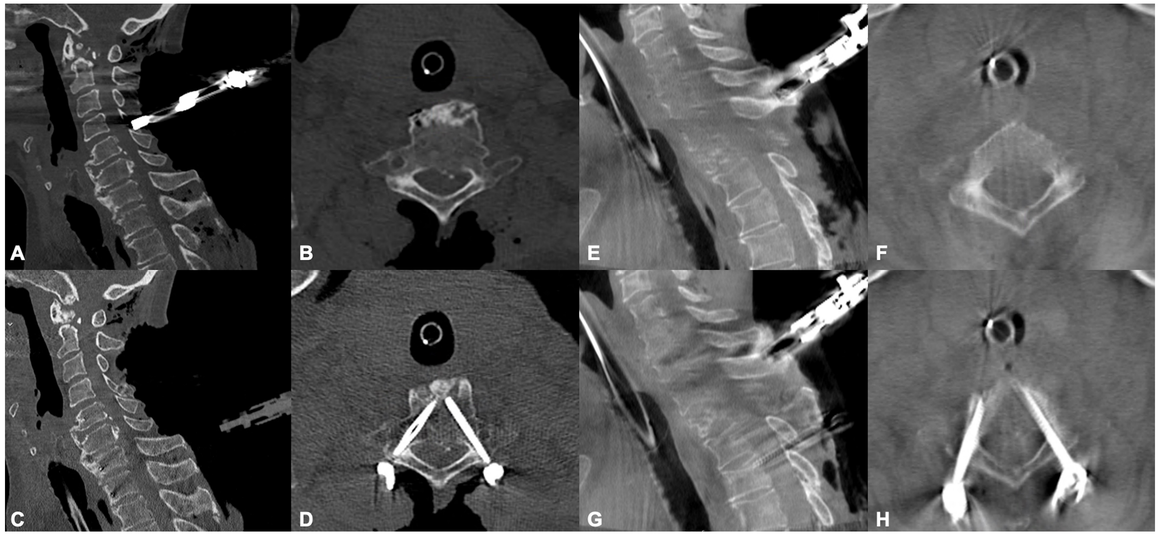

Figure 1: The figure shows cervicothoracic navigation scans before (upper row) and after (lower row) instrumentation of the ORCT group (A-D) and the CBCT group (E-H).

Results

Baseline characteristics including the number of screws per patient and the number of instrumented levels did not differ between the two groups. Although the accuracy of screw placement according to Gertzbein-Robbins classification did not differ between the two groups, more screws had to be revised intraoperatively in the CBCT group (ORCT: 39, 2.7% vs. CBCT: 23, 6.0%; p=0.0036).

	ORCT	CBCT	P-Value
First scan	484.0±201.1	687.4±188.5	**<0.0001**
Second scan	515.8±216.3	658.3±220.1	**<0.0001**
In case of third scan	531.3±237.5	641.6±177.3	**0.0140**
Total of all scans	1216.9±699.3	2000.3±921.0	**<0.0001**
Per level	461.9±429.3	1004.1±905.1	**<0.0001**
Per screw	172.6±110.1	349.6±273.4	**<0.0001**

*Table 1: The table shows radiation doses [mGy*cm] of the ORCT group and the CBCT group.*

Conclusion

The present results show that the applied radiation doses are significantly lower using an ORCT for navigated pedicle screw placement in spinal instrumentation. A modern CT scanner on a sliding gantry leads to lower doses, especially through automated 3D radiation dose adjustment.

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Disclosure

S.I. is consultant for Brainlab AG (Munich, Germany).

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