2020 Annual Conference Abstract Submission

PRESENTATION TITLE:
New Surface Anatomical Landmarks can Guide Pedicle Screw Placement Using Cortical Bone Trajectory

AUTHOR
Nikhil Shelke

DEGREE:
MD

IF NOT ACCEPTED FOR PODIUM PRESENTATION, IS POSTER PRESENTATION ACCEPTABLE?
Yes

LIST ANY DEVICES NOT CURRENTLY APPROVED FOR USE BY THE FDA:
n/a

STRUCTURED ABSTRACT (PURPOSE, METHODS, RESULTS, AND CONCLUSIONS) IN LESS THAN 400 WORDS:

Study Design: Retrospective Objective: To define a starting point for lumbar cortical bone trajectory (CBT) pedicle screws based on surface anatomic landmarks that can be easily seen during a small midline approach. Summary of Background Data: CBT allows for shorter incision length and less lateral retraction and dissection, due to a medialized starting point and an "up-and-out" trajectory. Despite being an open technique, surface landmarks for reliable placement are not well characterized, and fluoroscopic guidance of CBT has generally been recommended.

Methods: The CT scans of 59 randomly-selected trauma patients were uploaded to a 3D software where we virtually placed 5.0mm by 30mm screws. In the cephalo-caudal plane, the starting point was determined in relation to the extra-articular sulcus of the facet and the ridge that denotes its caudal extent. The starting point was chosen to be 3mm below this ridge. In the medial-lateral plane, the starting point was placed in reference to the lateral edge of the pars (LEP), also 3mm away to avoid a lateral breach. The screws were placed in a cephalad and lateral, and a 35mm length was attempted. We also measured pedicle width and compared it to the virtual breach rate.

Results: We placed screws without breaching in L1-L5 76%, 83%, 86%, 96%, and 89% of the time respectively. Pedicle width was significantly less with screws that breached the cortex ($p<0.0006$) and the pedicle width decreased and breach rate increased in the upper lumbar spine. Pedicles that have a width<6mm have an increased risk of pedicle breach with the cortical screw technique.

Conclusions: We were able to virtually demonstrate that surface landmarks can be utilized to determine a consistent starting point, potentially decreasing dependence on fluoroscopy for cortical screw placement. Our described entry point and trajectory also helps to gain maximum cortical bone contact and minimize the breach rate of the screws.