

Comparison of Freehand Screw Placement and 3D Printed Guides in Paediatric Scoliosis Surgery

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Disclosures

- Mr McCarthy – Educational contract Globus
- Mr James – Educational contract Nuvasive
- Mr Jones – Educational contracts Nuvasive, Kuros, Synergy and Paradigm
- Mr Muyengwa – Fellow
- Miss Clifford Spence – Medical Student

The Problems

- Missed screws: **ANOTHER TALK!**
 - Review of 152 paediatric cases 2013-2018
 - 2864 screws – all freehand placement – **no routine II until 2017/8**
 - 392 (14%) deemed malplaced on post op XR
- IONM alerts: **SEE THE POSTER!**
 - Review of 206 paediatric cases 2017-2022
 - 11 (5%) had a significant intraoperative neuromonitoring event
 - 1/3 during screw insertion and 1/3 during curve correction
- 12 claims settled 2003-2020 CVUHB for malplaced screws:
 - average cost - £599,000 each

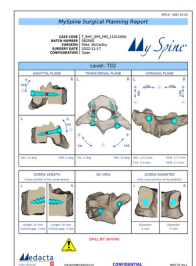
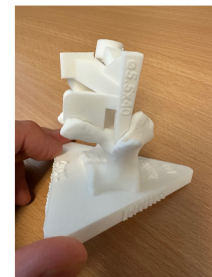
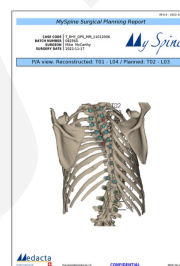


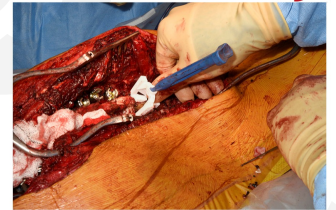
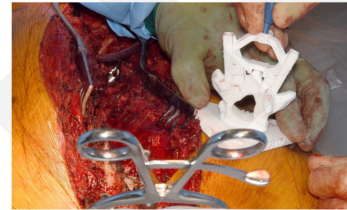
The Solutions



Cardiff Experience

- December 2022 – Medacta MySpine Guides for all Deformity Cases
- 25 cases (MM AJ SJ)
- 598 screws
- Compared to the preceding 25 cases – freehand (II check at end)
- 424 screws
- Technique – dual surgeon - precontoured rods with monoaxial screws in concavity – reduce spine to rod with towers then perform further derotation on mono screws - workflow unchanged by use of guides





Freehand vs 3D Printed Guides

- Cobb FHG
 - Preop 69.5 deg (59.7-79.2)
 - 10/25 >75 deg
 - 2 to Pelvis
 - Postop 30.5 deg (24.4-36.5)
 - Op Time
 - 165mins (149-181)
 - Screws
 - 17 (15.7-18.1)
 - Levels
 - 12.6 (11.6-13.6)
 - No difference in blood loss, LOS, change in Cobb
- Cobb 3DPG
 - Preop 82.4 deg (72.7-92.1) $p=0.055$
 - 17/25 >75 deg
 - 6 to Pelvis
 - Postop 40 deg (31.6-47.4) NS
 - Op Time
 - 190mins (176-204) $p=0.018$
 - Screws
 - 24 (22.7-25.6) $p<0.001$
 - Levels
 - 14.4 (13.7-15.1) $p=0.004$



Freehand vs 3D Printed Guides

- Time per screw FHG
 - 9.8mins (9.1-10.5)
 - Intraop Malplaced Screws FHG
 - 38/424=9% *best case
 - Postop Malplaced Screws FHG
 - 7/424=1.7% (now using intraop II)
 - FHG 1 cord monitoring event – malplaced screw
 - No neurodeficits in any patients
 - FHG 1 RTT – proximal screws pulled out
- Time per screw 3DPG
 - 8.1mins (7.4-8.8) $p=0.001$
 - Intraop Malplaced Screws 3DPG
 - 21/598=3.5% **worst case
 - Postop Malplaced Screws 3DPG
 - 3/598=0.5%

* No data on the screws unable to be sited in the FHG
** Almost all screws can be sited in 3DPG



Freehand vs 3D Printed Guides

- Conclusion
 - 3DPG bigger curves, more instrumented levels, more screws inserted and longer constructs to pelvis
 - Longer operative times but no difference in blood loss or LOS
 - Time per screw insertion was significantly less
 - Number of mal-placed screws was reduced



