

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

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Disclosures

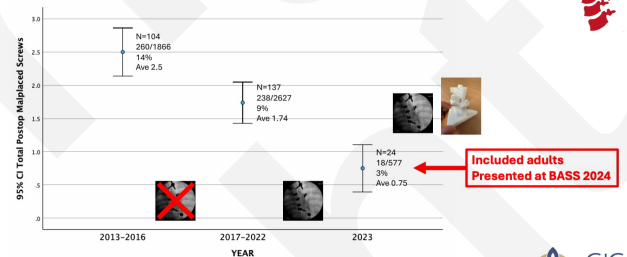
- Mr McCarthy – Educational contract Globus
- Mr James – Educational contract Nuvasive
- Mr Jones – Educational contracts Nuvasive, Kuros, Synergy and Paradigm
- Mr Muyengwa – Fellow
- Miss Clifford Spence – Medical Student

The Problems

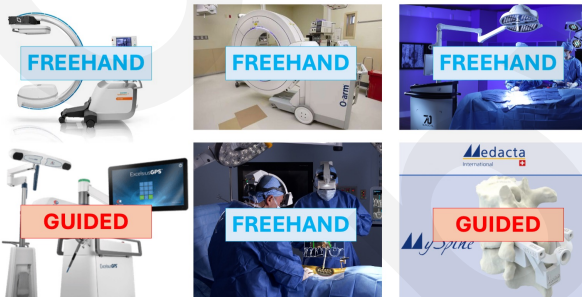
- Missed screws:
 - Review of 265 paediatric cases 2013-2023
 - 5070 screws – all freehand placement – **no routine II until 2017/8**
 - 516 (10%) deemed misplaced on post op XR
- IONM alerts:
 - Review of 206 paediatric cases 2017-2022
 - 11 (5%) had an intraoperative neuromonitoring event
 - 1/3 during screw insertion and 1/3 during curve correction
- Claims:
 - 12 Malplaced screw claims 2003-2020 CVUHB (all surgeries)



The Problems



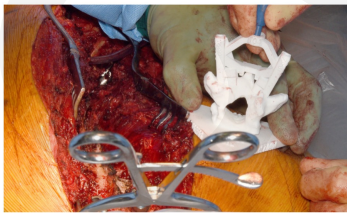
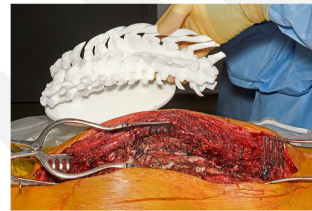
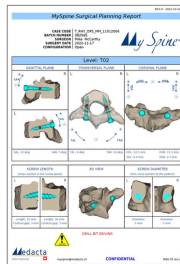
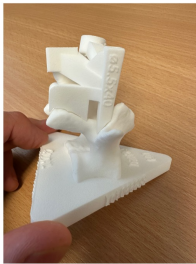
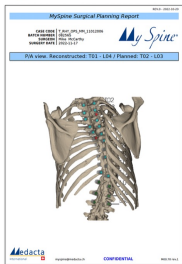
The Solutions



Cardiff Experience

- December 2022 – Medacta MySpine Guides for all Deformity Cases
- 48 Paediatric cases <18yrs
- 1053 screws
- Compared to the preceding 70 paediatric cases – freehand (II check at end)
- 1237 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

	Freehand n=70	3D-printed guides n=48	
Number of screws	1237	1053	
Number of levels	13.1	13.7	NS
Patients with screws to pelvis	4%	17%	p<0.05
Screws per patient	17.7	21.9	p<0.001
Intraop malplaced screws per pt	1.5	0.85	p=0.009
Postop malplaced screws per pt	0.5	0.15	p<0.05
% of screws considered malplaced	3%	0.7%	p<0.05
Total postop long screws	15	2	NS

Freehand vs 3D Printed Guides

	Freehand n=70	3D-printed guides n=48	
Op time	175 mins	169 mins	NS
Time per screw	10 mins	7.8 mins	p<0.001
Blood loss	778 ml	767 ml	NS
CT radiation dose	54 mGycm ²	550 mGycm ²	p<0.05
Il radiation dose	0.09Gycm ²	0.14 Gycm ²	NS
Postop CT	5 patients	2 patients	NS

- Preop Cobb, postop Cobb and change in Cobb were not significantly different between the groups (73/75deg to 30/32deg)
- Average of 0.73 jig issues reported per patient

Freehand vs 3D Printed Guides

• Conclusion

- 3DPG - more screws inserted and longer constructs to pelvis
- Time per screw insertion was significantly less
- No change in op time, blood loss or length of stay
- Number of mal-placed screws was reduced

