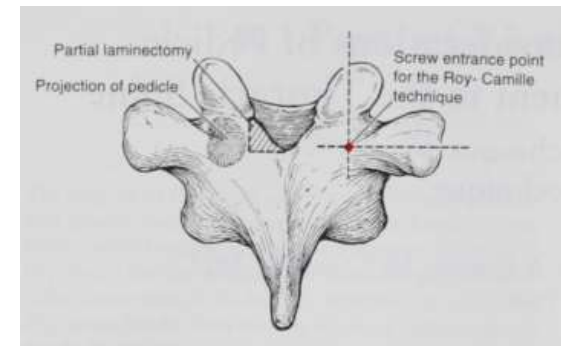

Abstract number: **43543**

Pedicle screw placement accuracy using a new intraoperative Cone-Beam Computed Tomography imaging technique: retrospective analysis of 586 screws.

V. Cordemans, L. Kaminski, X. Banse, N. Irda, B. Francq and O. Cartiaux

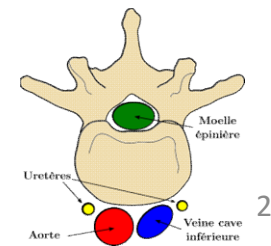
Introduction: pedicle screws

- Commonly
- Trauma, degenerative disease, malignant disease, scoliosis, infection
(Boos et al., Eur Spine J, 1997)
- Ideally position:
 - ✓ Entirely contained within the pedicle
 - ✓ Without breach



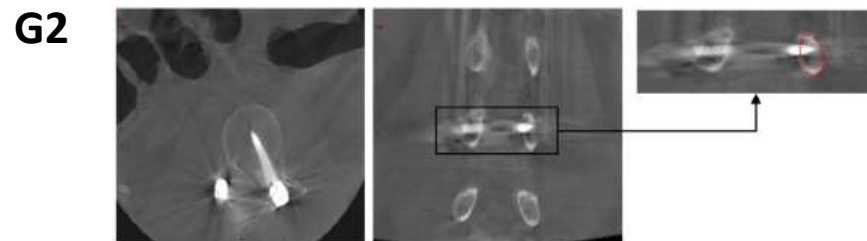
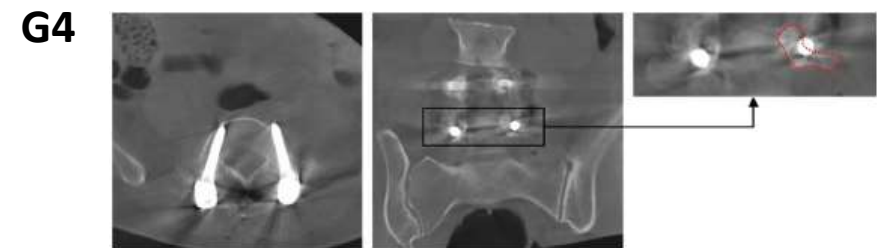
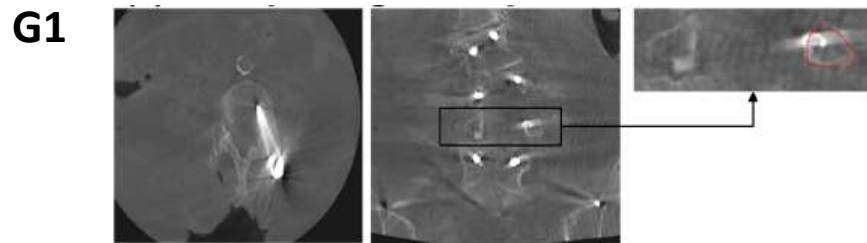
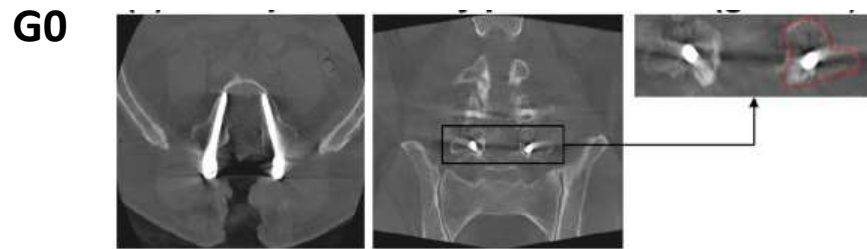
(R Xu et al., Spine, 1998)

- ⚡ Complications: nervous, vascular and visceral injuries
(Jutte et Castelein, Eur Spine J, 2002)



Introduction

- Gold standard for evaluation:
 - ✓ intraop: manually palpation
 - ✓ postop: CT scan (Sembrano et al., Int J Spine Surg, 2012)
 - Gertzbein and Robbins classification



Intraoperative device

2D

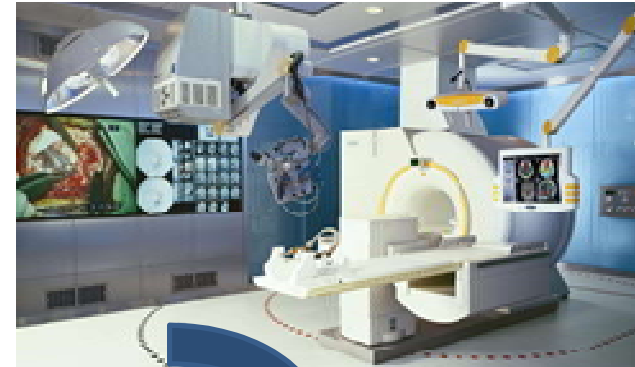


Siemens, Germany

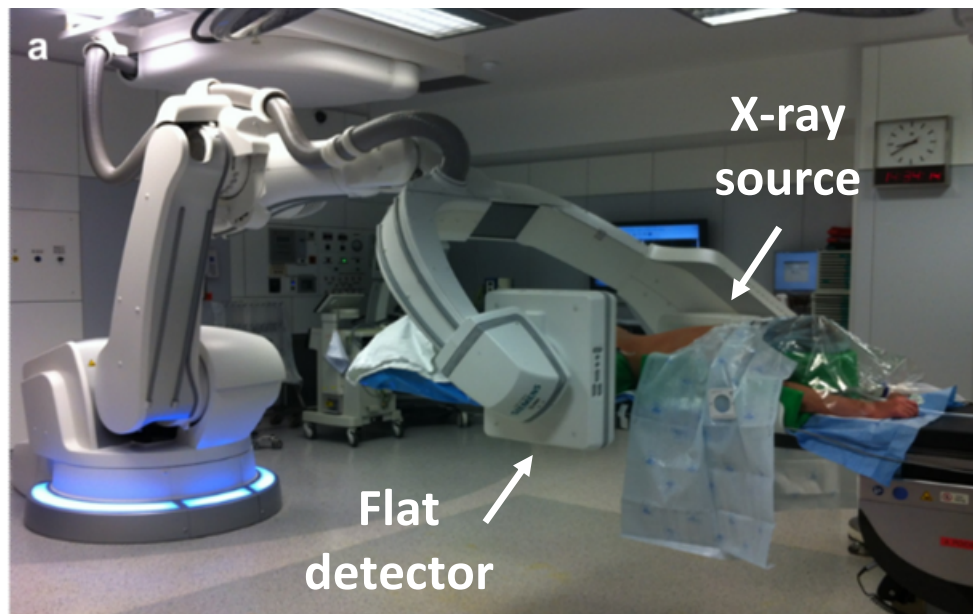


Medtronic, USA

3D



New intraoperative Cone-Beam CT imaging technique



OBJECTIF:

Ability of intraop
CBCT compare to
postop CT **for**
pedicle screws
assessment

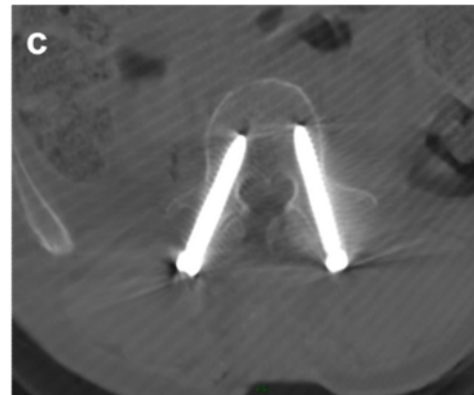
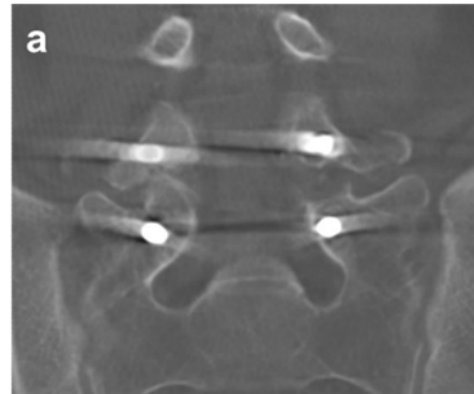
Materials and Methods

- **102** patients over 21 months
- **586** pedicle screws inserted freehand
- Intraop CBCT of 586 screws
- Postop CT of **239** screws
- Retrospectively reviewed by 2 surgeons according Gertzbein and Robbins classification
- Reliability tests: Cohen's kappa and Gwet's
- Sensitivity, specificity, PPV and NPV
- Radiation :
 - Total DAP (Gy.cm²)
 - Total SD (mGy)
- Operative Time (min)

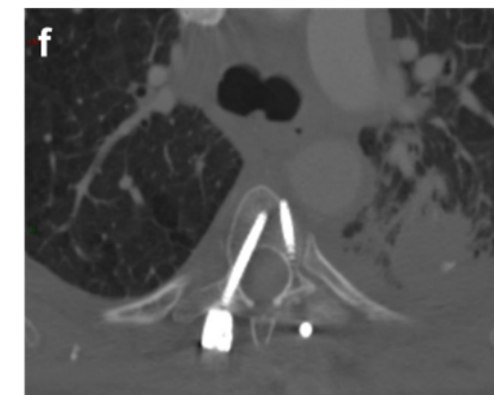
Results 1

Kappa = 0.80
Gwet = 0.93
Sensitivity = 0.77
Specificity = 0.98
PPV = 0.91
NPV = 0.96

Intra-op CBCT



Post-op CT



Results 1

		Post-op CT assessment							Total
		A	B	C	D	E	F	G	
Intra-op CBCT Assessment	A	<u>197</u>	4	4	0	0	0	1	206
	B	0	<u>11</u>	0	0	0	0	0	11
	C	1	0	<u>8</u>	2	0	0	0	11
	D	0	0	0	<u>2</u>	0	0	0	2
	E	0	0	0	0	<u>1</u>	0	0	1
	F	0	0	0	0	0	<u>0</u>	0	0
	G	0	0	0	0	0	0	<u>8</u>	8
Total		198	15	12	4	1	0	9	<u>239</u>

Results 2

- **Radiation:**
 - Total DAP: med 62.66, mean 80.87, max 30.283 and min 4.48
 - Total SD: med 206.1, mean 265.87, max 1003 and min 30.7
- **Operative Time:**
 - Total time in OR: mean 380.61, max 812, min 187 and med 358
 - Surgery time: mean 258.12, max 651, min 187 and med 237

Discussion

- Intraop CBCT allows for accurate assessment of pedicle screw placement
- and presents the clinically relevant potential for direct repositioning of misplaced screws
- thereby helping to reduce the re-operation rate and the number of postop CT scans required.

Dr Cordemans received research grant from Siemens
Dr Banse is consultant for Siemens

Thank you!

V. Cordemans, L. Kaminski, X. Banse, N. Irda, B. Francq and O. Cartiaux