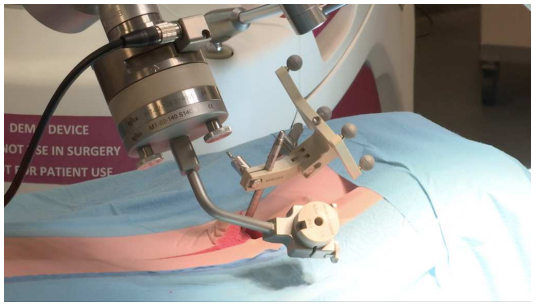
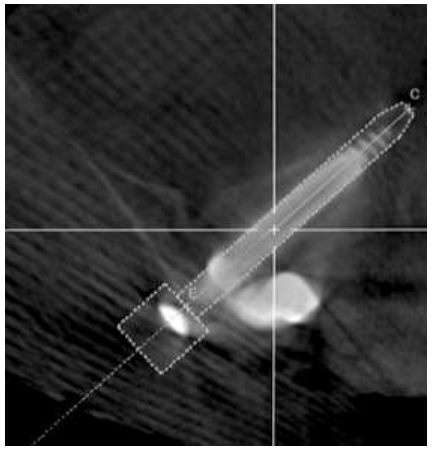
ICEOS
13TH INTERNATIONAL CONGRESS ON EARLY ONSET SCOLIOSIS
NOVEMBER 21-22, 2019
THE WESTIN PEACHTREE PLAZA, ATLANTA — ATLANTA, GA





Accuracy of screw placement in minimally invasive, robot-assisted iliosacral screw insertion in children with early onset neuromuscular scoliosis

Deroussen F, Lefranc M, Klein C, Gouron R

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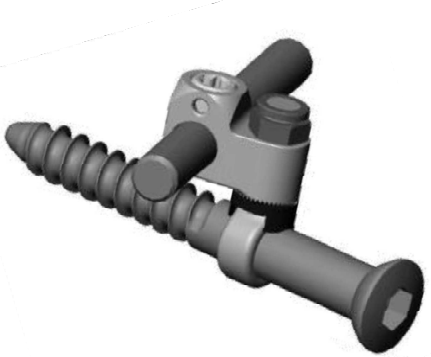
GRECO Institute for research in robotic surgery

Amiens FRANCE

Disclosure

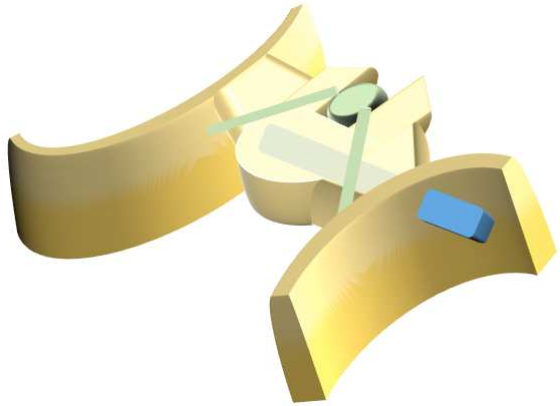
- Pr Gouron declares to be consultant for Implanet France
- Pr Lefranc declares to be consultant for Zimmer Biomet producing the Rosa® robot

Introduction



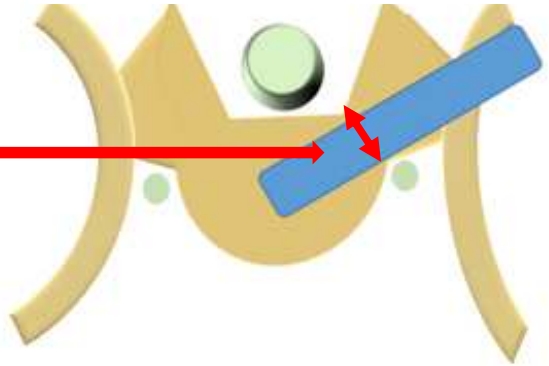
- Iliosacral screw (ISS) is an optimal implant for :
  - Stability even in porotic bone
  - Correction of pelvic obliquity in neuro-muscular scoliosis

(Miladi L and al. Spine 1997 ; Peelle MW, and al. Spine 2006 ; Zahi R and al. Childs Nerv Syste 2010 ; Awwad W and al, Eur J Orthop Surg Traumatol 2015)



- Proximity of ISS to neurovascular structures.

Safety corridor 21mm, Trigono = 4°.

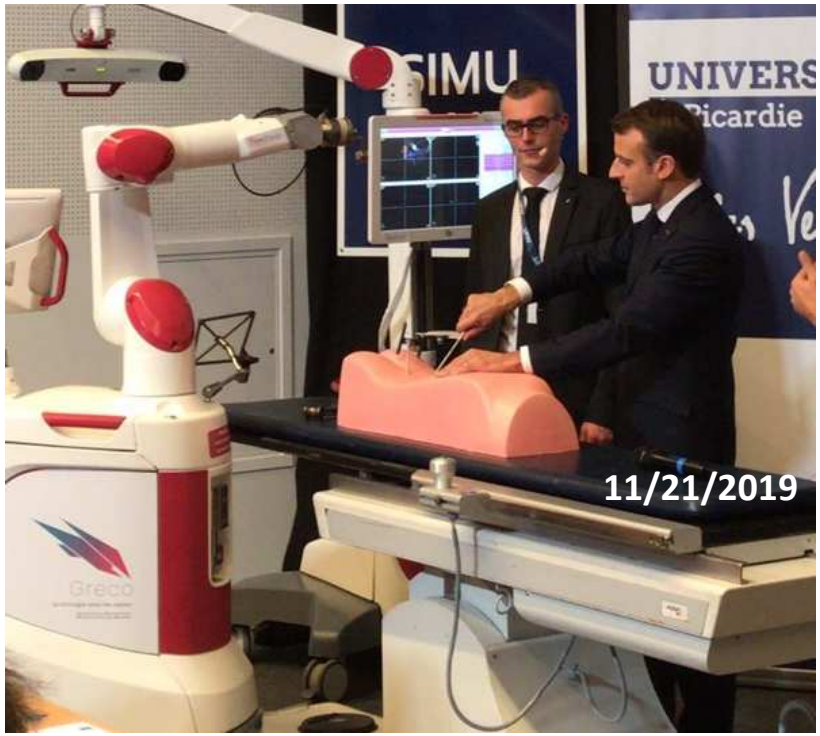


(Templeman D, Clin Orthop Relat Res 1996)

- Very young patients or with severe deformities

Surgical Technique

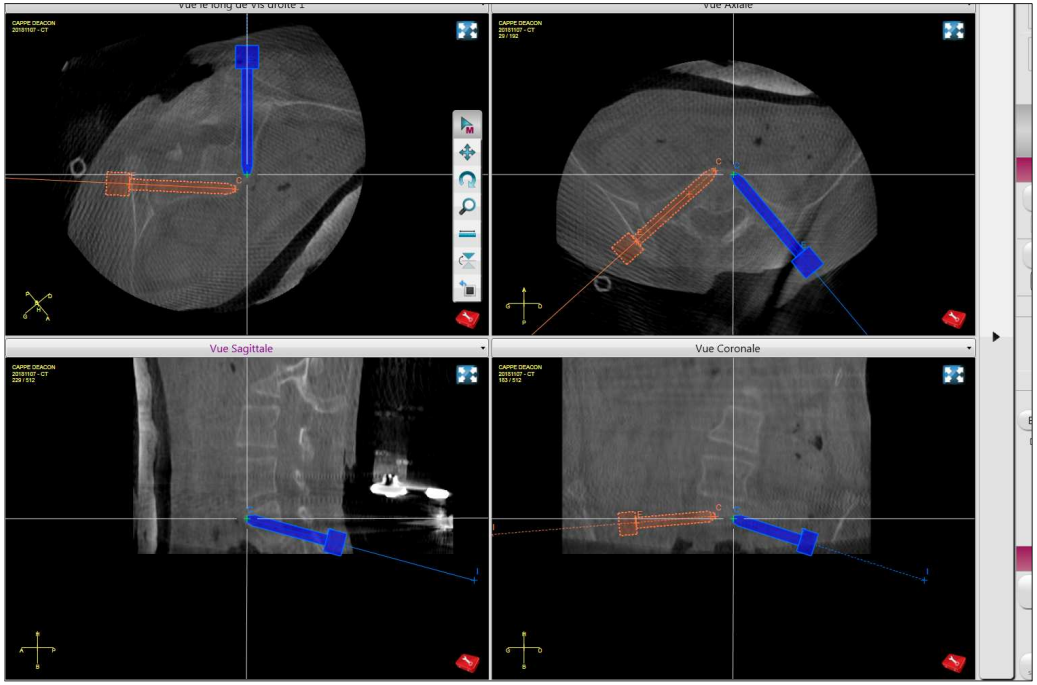
Development of an operative technique in a simulation center for the insertion of ISS planned + guided using robotic assistance



3D printed reproduction of our first case

Surgical Technique

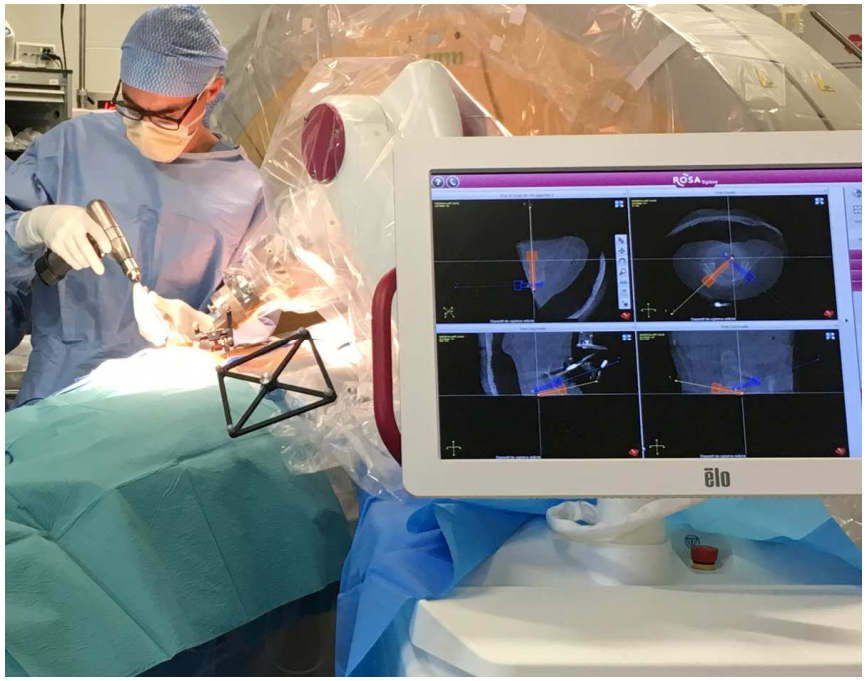
- Planning the position of the ISS

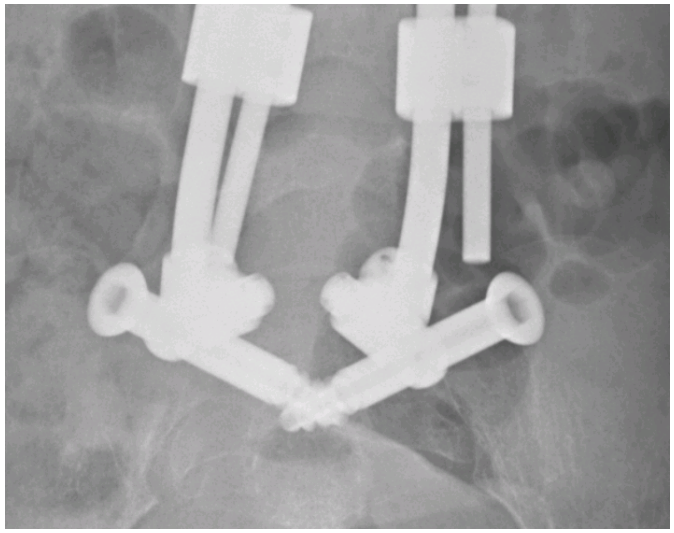


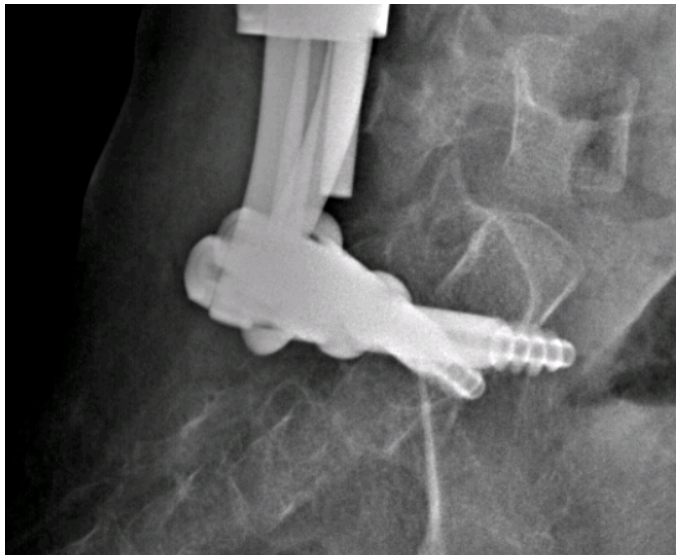
- Bipolar instrumentation in double team

Objective

To evaluate the accuracy of iliosacral implant inserted with robotic assistance

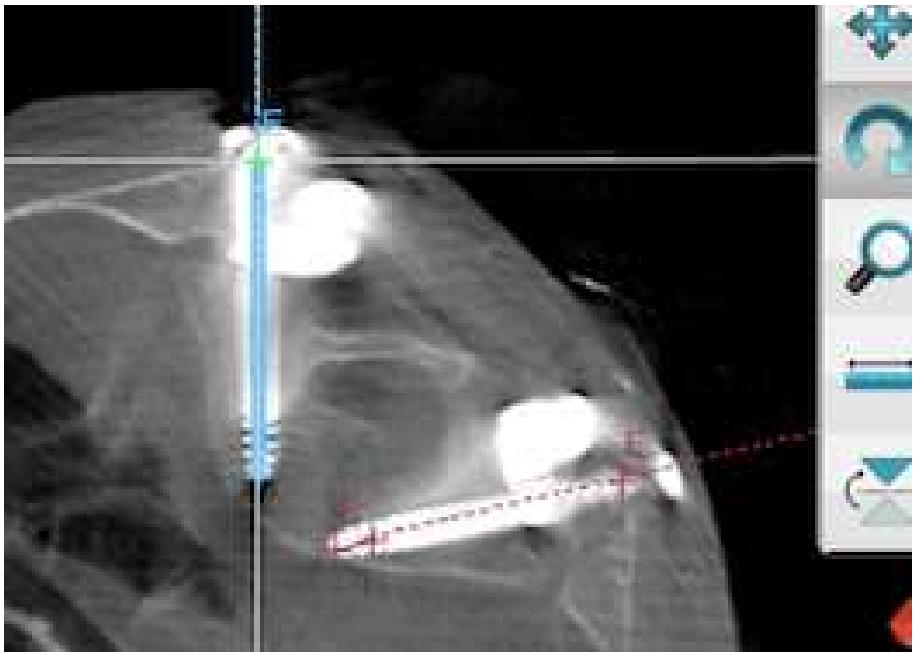






Material and Methods

- Retrospective study of all patients operated on since October 2017
  - Cortical breach (Ravi *et al*.)
  - Comparison of the surgical planning performed on the robot's software and the actual position of the screws.
- The pre- and post-surgery flat-panel CT images were merged
- The distance was measured at two points on the trajectory:
  - **Iliac entry point**
  - **Screw tip’s target point in the sacrum**

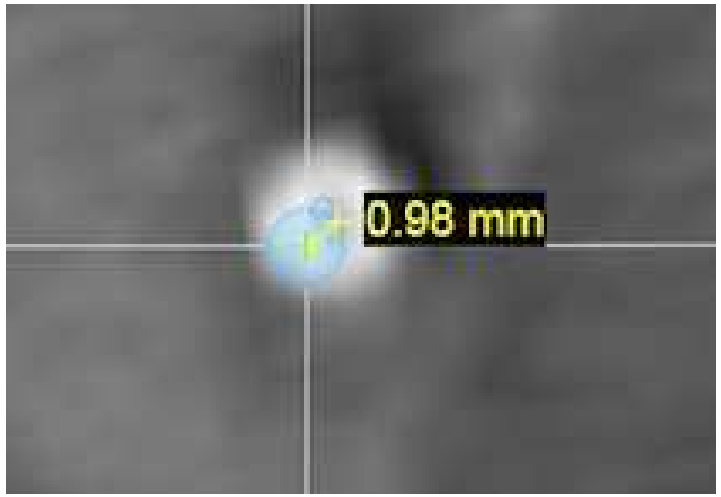


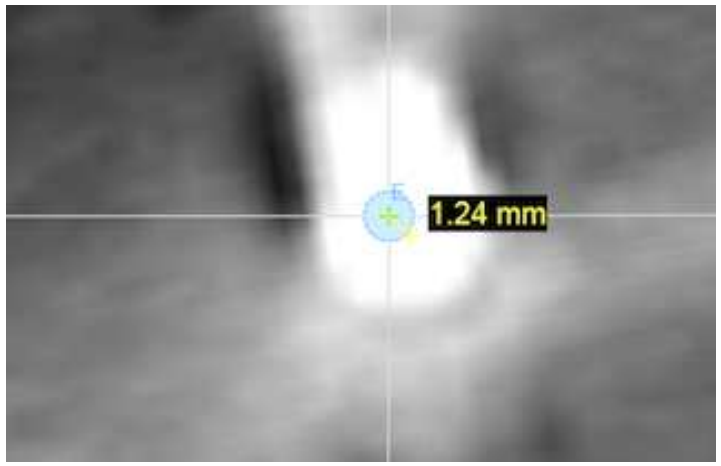
Results

- 15 patients (8 boys, 7 girls)
- Mean age: 11.8 years (7.3 to 18.2)
- 30 Ilio-Sacral Screws
- Absence of cortical breaches
  - 100% Ravi grade A
- Mean error =
  - 1,66 mm at the entry point

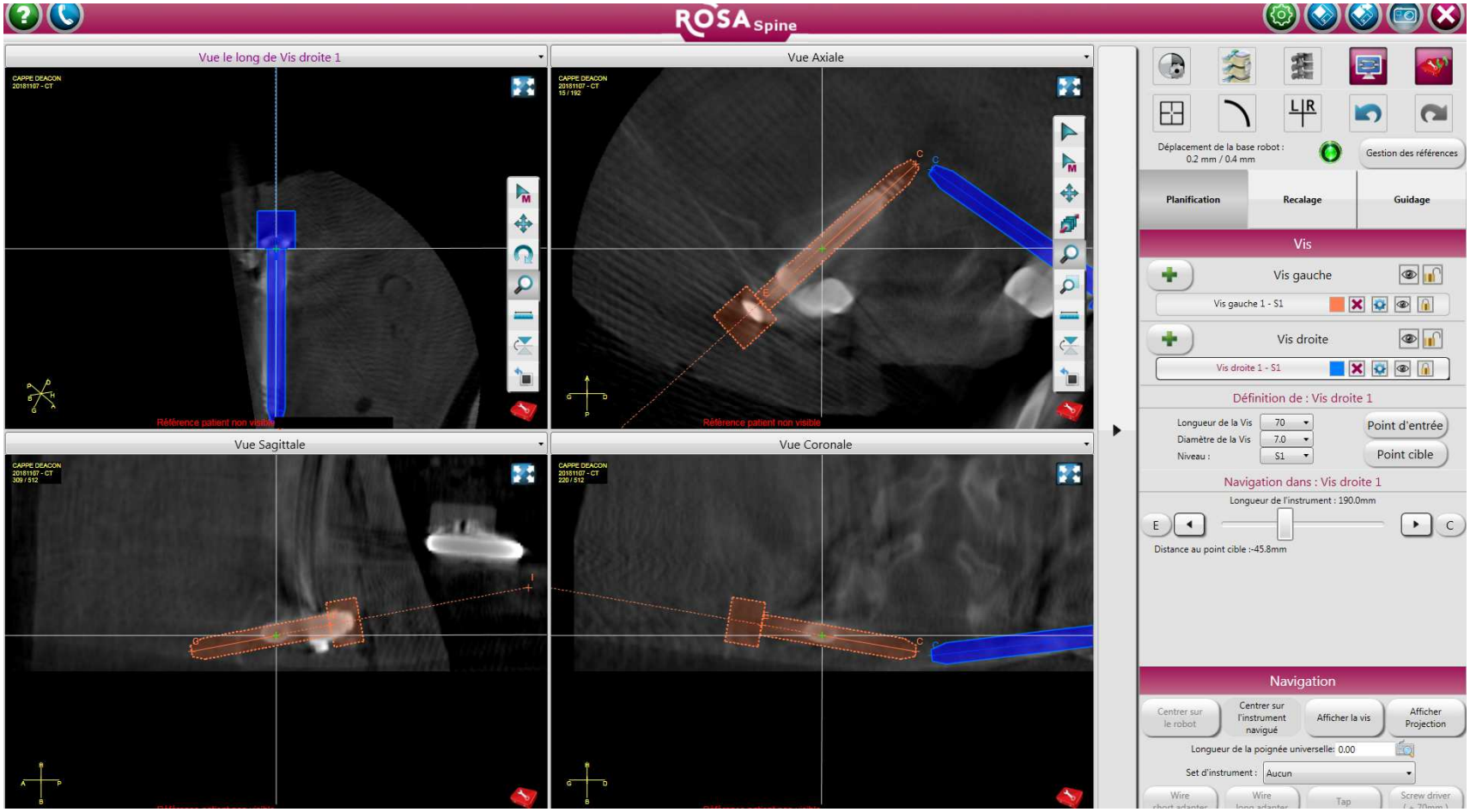
  (min 0,13 ; max 3,12 ; SD : 0,73)
  - 1,29 mm at the target point

  (min 0,4 ; max 2,4 ; SD : 0,44)



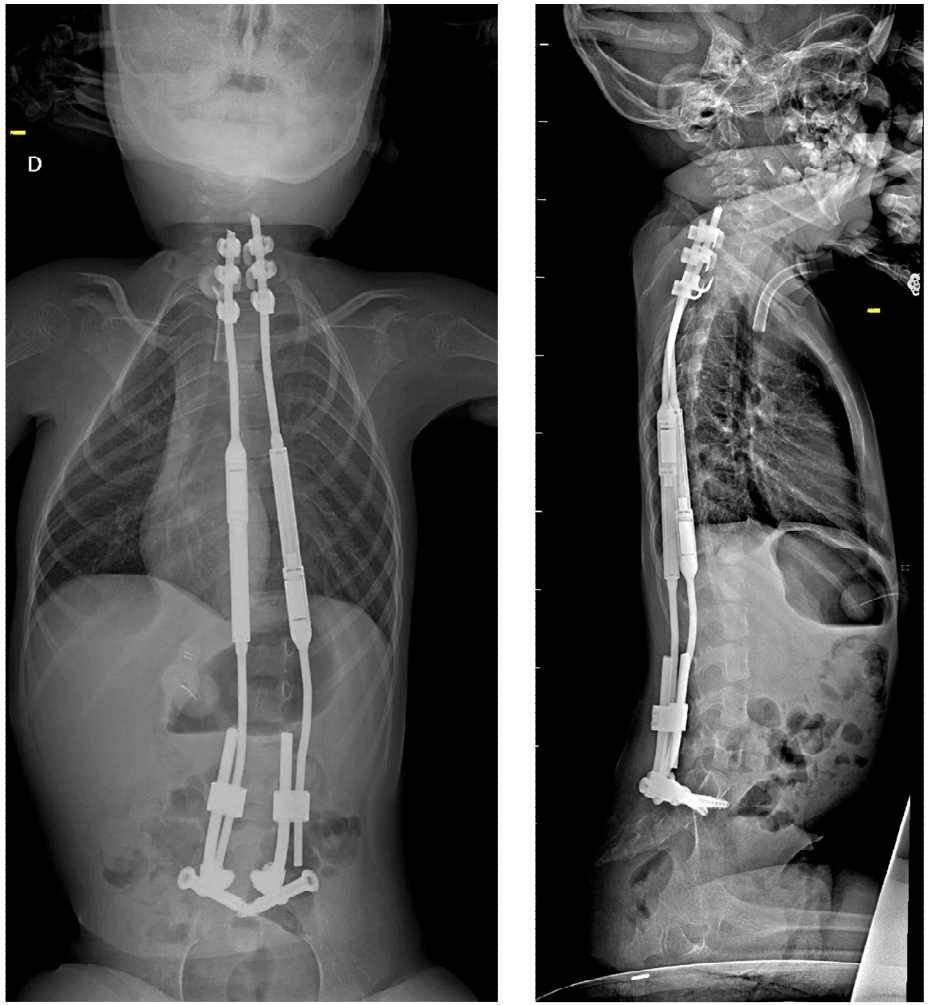


Results


ROSA Spine
Vue le long de Vis droite 1
Vue Axiale
Vue Sagittale
Vue Coronale
Référence patient non visible
Déplacement de la base robot :
0.2 mm / 0.4 mm
Gestion des références
Planification
Recalage
Guidage
Vis
Vis gauche
Vis gauche 1 - S1
Vis droite
Vis droite 1 - S1
Définition de : Vis droite 1
Longueur de la Vis
Diamètre de la Vis
Niveau :
Point d'entrée
Point cible
Navigation dans : Vis droite 1
Longueur de l'instrument : 190.0mm
Distance au point cible :-45.8mm
Navigation
Centrer sur le robot
Centrer sur l'instrument navigué
Afficher la vis
Afficher Projection
Longueur de la poignée universelle: 0.00
Set d'instrument :
Aucun

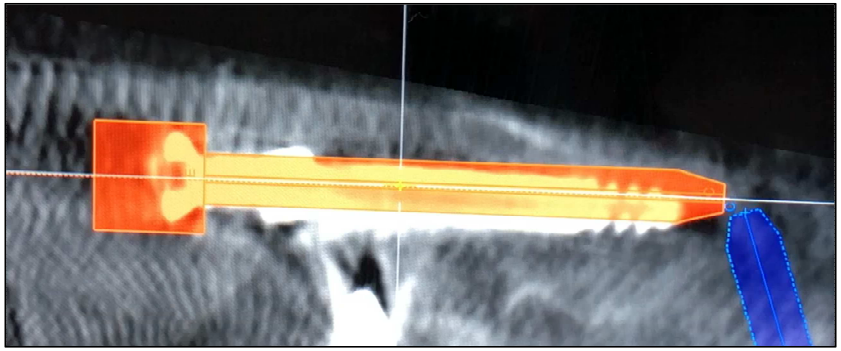
Discussion

- Iliosacral screws (CT planning coupled with navigation)
  - In traumatology (Takao M, Injury 2014)
  - For adult spinal deformity with a minimally invasive fusionless bipolar construct (Wolff, Orthop Traumatol Surg Res 2019)
- Respect in 100% cases of the Safety corridor
  - even in our youngest patient. (8mm)

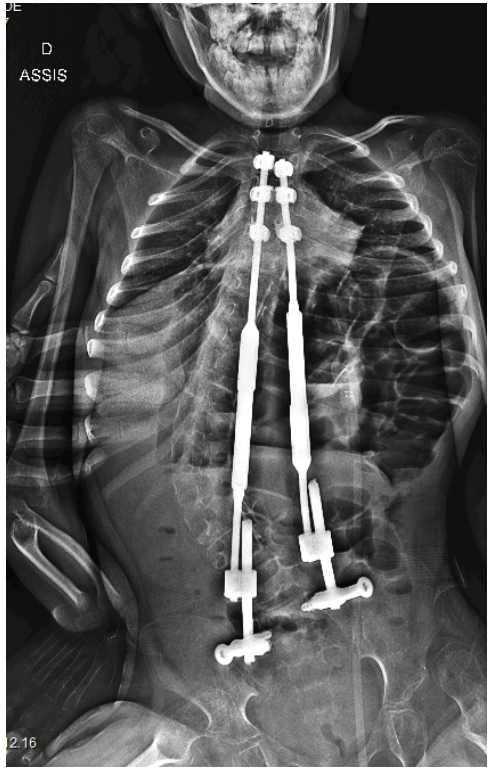


Conclusion

- Optimal positioning despite deformity and small size
- Concordance between planning and positioning
- Precision of implantation of ilio-sacral screws
  - Bio-mechanical efficiency
  - Limited Morbidity for young or very fragile patients



Our worst screw



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