



CENTER FOR DISRUPTIVE  
MUSCULOSKELETAL INNOVATIONS

# Lumbar-sacral Destruction Fixation Biomechanics

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- Instrumenting the spinal column with lumbo-sacral deficiency is a challenge
- The deficiency can occur with destruction following tumors or in a lumbo-sacral deficient model
- Developed a customized/innovative implant
- Have used in 4 cases (3 sacral agenesis and 1 Neurofibromatosis)

# Clinical Need and Industrial Relevance

## Current Options and Challenges

- **Dunn MacCarthy hooks**
  - Bio-mechanically not a sound implant
  - Implant bulk and prominence
  - Migration, loosening
  - Requires a good host bone stock



# Clinical Need and Industrial Relevance

## Current Options and Challenges –contd.

- **Iliac bolts**
  - Bulky implants
  - Need to have an offset connector further increases bulk
  - Requires strong host bone for purchase of large diameter screws



# Clinical Need and Industrial Relevance

## Current Options and Challenges –contd.

- **S2AI construct**
  - Best option in the intact spine
  - Inadequate / deficient anchor host bone





- **Tuning Fork plate, Concept Evolution**
  - Idea started with a VSP bent over and placed securely over intact Iliac crest
  - Evolved to the concept of a tuning fork that straddles the intact Iliac crest providing a strong distal fix with screws
  - Fix in the thoracic spine / rib anchor points proximally.

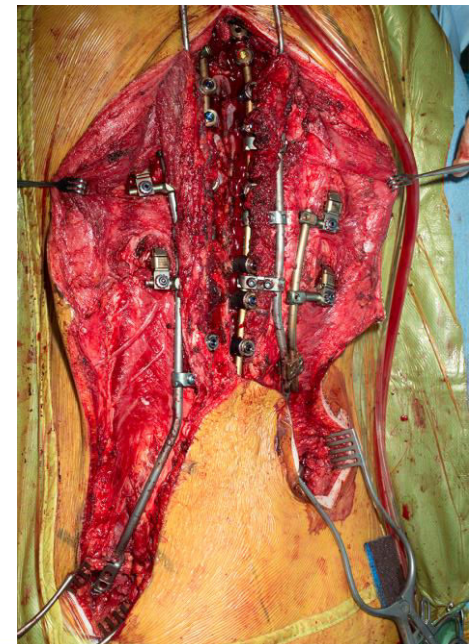
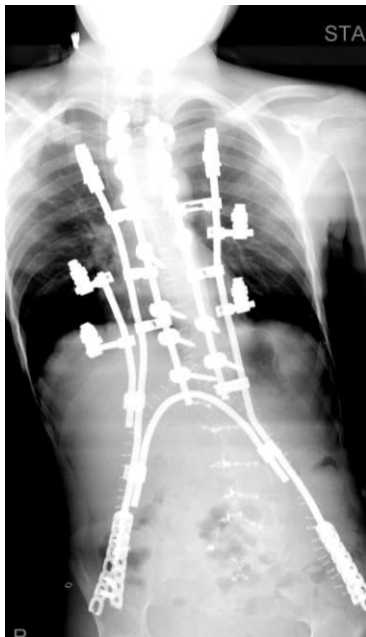


- **Tuning Fork plate**
  - The 2 'prongs' of the tuning fork plate straddle the crest and are held with screws through the holes
  - Proximal construct varies with the available anchors



# Clinical Need and Industrial Relevance

- Tuning Fork plate
  - Variable proximal construct
  - Distal fix with Tuning fork plate





# Project Aims

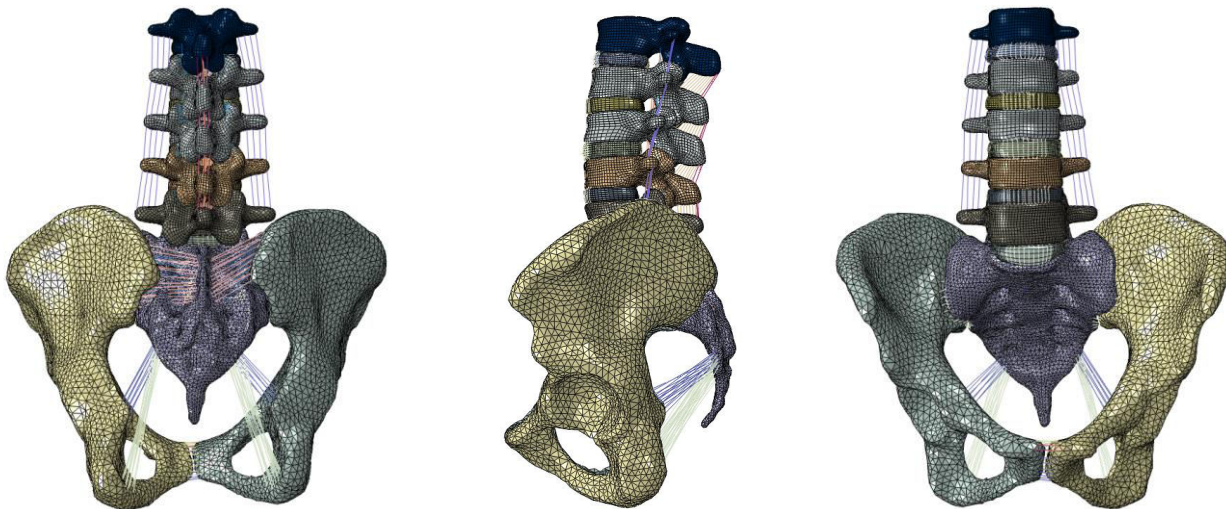
- Assess the bio-mechanical profile of the tuning fork plate compared to a standard S2AI pelvic fixation in a lumbo-sacral deficient model.
- Would help clarify indications and clinical profiling for the use of the tuning fork plate – a new concept
- .

- 6 specimens in each of the two groups, Group I and Group II
- Osteoporotic on DEXA scans
- X-rays for the specimens

## Methods for the two groups

- Group I: S2AI pelvic fixation
- Group II: Tuning fork plate
  - Stabilization T10 – L2 with 6.5 mm pedicle screws
  - L3 – Sacrum removed \_Deficiency Model
  - Tuning fork plate with flanges contoured and ‘locking’ screws inserted to fix the tuning fork to the pelvis
  - The rod of the implant contoured and fixed into the proximal pedicle screws

- FE modeling for comparison
  - Prepare FE models of the above construct protocols using our platform FE Model technology
  - Compute stresses, strains, load sharing and compare the two groups



# Milestones & Timeline

Milestones	
Finishing model development	December 31, 2016
Data collection	July, 2017
Data analysis	August 31, 2017



- Quarterly presentation updates:
  - December 2016 – conference call
  - Spring 2017 – Spring Symposium @ UT (conference call option for non-UT teams)
  - June 2017 – conference call
  - September 2017 – Fall Symposium @ UCSF (conference call option for non-UCSF teams)
- Final written report including results - October 31, 2017
- Specific work product (e.g. abstracts, manuscripts and potential new concept)

# Proposed Budget

General Budget Outline	
Personnel	\$25,000
Imaging	\$1,000
Cadaver specimens	\$10,000
Total Direct	\$36,000
In directs (10%)	\$3,600
Total	\$39,600