AFTER NINE YEARS OF THREE-COLUMN OSTEOTOMIES, ARE WE DOING BETTER?

PERFORMANCE CURVE ANALYSIS OF 573 SURGERIES WITH 2 YEAR FOLLOW-UP.

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Adult Spinal Deformity

- **Prevalence of ASD**
  - 2.5% - 25%
  - As high as 68% in pop. >60yo

- **Economic Impact:**
  - 291 million work days lost due to back and neck pain
  - $131.8 billion loss in annual earning for persons with back/neck pain

- Projected to increase as population age increases.
3CO: the bad news
- ASD – Severe burden
- Risk/Benefit of recovery
- Costly procedure
- High Complications rate
- High Revision rate

Lack of quantifiable performance evaluation in literature
Multicenter Retrospective Database (11 Sites)

- **Benefit of experience in outcomes?**
  - Study group performance over time

- **Quantifiably evaluate the performance curve of ISSG**
  - OR Time
  - Success Rate
  - Complication Rate
  - Revision Rate
Inclusion Criteria
- Adult Spinal Deformity
- >18 yo
- Thoracic or Lumbar osteotomy (3CO)

Full length Standing X-Rays
- Pre-Operative
- 2y Follow-Up

Complication Data
- Intra-operative
- Post-operative
- Revision

OR Data
- OR Time
- Blood Loss

ODI

Study Population
- 2004-2008
- 2008-2009
- 2009-2010
- 2010-2013

Methodology

Anova
- SVA
- PT
- PI-LL
- Angle of Resection

Kruskal-Willis
- ODI Score
- Operating Room Time
- Blood Loss

χ²
- Revision Rate
- Intra-Operative Complications
- Post-Operative Complications
- Success Rate
Patients in 4 groups had comparable:
- Age (57-61 y/o), BMI (26-28 Kg/m²) and Gender Ratio (67-71%)

Patients in the most recent group were significantly older and more disabled.

Recent patients had significantly more bone resection, and less OR time. Utilization of PSO vs. VCR and iliac bolt in LIV have significantly increased.
Intra-operative complications:
- Comparable rates overtime
  - 5.9 – 6.4%

Post-operative complications:
- Significant decrease in bowel/bladder neuro deficit rates
  - 4.2% in 2004-2008
  - 0.07% in 2010-2013

- Significant decrease in EBL > 4L:
  - 27% in 2004-2008
  - 17% in 2010-2013

- Significant decrease in pseudoarthrosis rates:
  - 16.8% in 2004-2008
  - 6.9% in 2010-2013

Significant decrease in overall post-operative complications rate over time
Revision Rate at 2 years
- Significant decrease in Revision Rate
  - 45% in 2004-2008
  - 30% in 2010-2013

Success (No Complication or Revision)
- Significant increase in Success Rate
  - 25% in 2004-2008
  - 51% in 2010-2013
3CO Osteotomy

**Performed on more disabled Population**
- Up trending baseline ODI
- 34 -> 48
- \( p = 0.001 \)

**With better technical ability**
- Increased bone resection \( \triangle \)
- 20° -> 26°
- \( p = 0.011 \)

**Diminishing OR Time**
- 48 min Reduction
- 420 min -> 382 min
- \( p = 0.001 \)

**Reduced Complication Rate**
- 18.3% Reduction
- 57% -> 39%
- \( p = 0.023 \)

**Reduced Revision Rate**
- 15% Reduction
- 45% -> 30%
- \( p = 0.039 \)

**Improved Success Rate**
- 26% increase
- 25% -> 51%
- \( p = 0.001 \)
Performance Evaluation
- Experience in performing 3CO over time leads to improved outcomes/adverse events
- Significant improvement in success rate supports continuation of 3CO as an option for severely deformed patients

Future studies:
- Institution/Surgeon specific learning curve analysis
- Exchange techniques and methods to improve clinical outcomes
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