How Much Will I Improve After My Surgery and Will I Be Normal? The Critical Importance of Collecting and Discussing Patient Reported Outcomes Measures (PROMs) With Adult Spinal Deformity (ASD) Patients

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Disclosures Shay Bess

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Background Information

- Common pre-surgical questions
  - What will improve?
  - How much I will improve?
  - Will I be normal?

- Outcomes ASD surgery
  - PROMs= improvement pain, function
  - PROMs= difficult to understand
  - MCID, SCB= difficult to understand

- Little understandable information (patient perspective)
  - What will improve
  - How much it will improve
ASD and Disability

- ISSG Spine 2016
- Quantify ASD disease impact
  - ASD cohort (n=497)
  - No prior surgery
- ASD SF-36 PCS, MCS
  - Population norm
  - Generational norms
  - Chronic disease
- ASD vs. U.S. generational norms: PCS
  - <25th percentile all generations
  - More rapid decline than U.S. general

### ASD vs United States Norm SF-36PCS

<table>
<thead>
<tr>
<th>Age Group</th>
<th>US Norm</th>
<th>ASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td></td>
<td></td>
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<tr>
<td>18-24</td>
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<td>25-34</td>
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<td>35-44</td>
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<td>45-54</td>
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<td>55-64</td>
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<td>65-74</td>
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<td>&gt;75</td>
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- *US Norm vs ASD in various age groups.*
ASD and Disability

- ASD no other comorbidities vs U.S.
  - <25th percentile
  - All ASD generations (except 18-24 yr)
  - More rapid decline than U.S. general

- ASD vs. US Healthy and Disease Norms
  - >1 MCID back pain/sciatica
  - >1 MCID Hypertension

- Similar
  - Cancer
  - Diabetes
  - Heart disease
ASD Deformity Type and Disability

- ASD heterogenous
  - Type (sagittal, coronal, mixed)
  - Location (thoracic, lumbar, etc)
  - Severity
- Cohort division
  - SRS-Schwab Classification
- PCS worsens
  - Curve location
  - Sagittal malalignment
ASD Type, Severity and Disease Correlates

- **US general vs. MT curve vs. L curve vs. SVA >5 vs. SVA >10 vs. L curve + SVA >5 vs. L curve + SVA >10**
  - Cancer and diabetes
  - US total and back pain
  - OA and heart disease
  - OA and 25th OA
  - 25th OA and 25th RA
  - 25th OA and 25th RA
  - 25th limited vision and 25th lung disease
  - 25th limited use legs
  - No comparable disease value

- **ASD PCS, Disease 1 PCS, Disease 2 PCS**
Study Question and Purpose

- Baseline disability dependent ASD
  - Type and severity
- Surgical improvement dependent ASD?
  - Type and severity
- Multi-center, prospective ASD database
- Different spine deformity types
  - SRS-Schwab ASD Classification
- Quantify postoperative percentage improvement
  - Back and leg pain
  - Self-image
  - Physical and social function
  - Mental health
- Assess return to generational norms
- PROM domains most impacted
Materials and Methods

- Data source
  - ISSG database
  - Multi-center, prospective, ASD

- Database inclusion criteria
  - Age >18 years
  - Minimum one: scoliosis >20°, SVA >5cm, PT>25°, TK >60°

- Study inclusion criteria
  - Surgery for ASD
  - PSF ≥4 levels
  - Minimum two year follow-up

- ASD type
  - SRS-Schwab ASD Classification

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Coronal Curve Types

- **T**: Thoracic only
  - with lumbar curve < 30°

- **L**: TL / Lumbar only
  - with thoracic curve <30°

- **D**: Double Curve
  - with T and TL/L curves > 30°

- **N**: No Major Coronal Deformity
  - all coronal curves <30°

Sagittal Modifiers

- PI minus LL
  - 0 : within 10°
  - + : moderate 10-20°
  - ++ : marked >20°

- Global Alignment
  - 0 : SVA < 4cm
  - + : SVA 4 to 9.5cm
  - ++ : SVA > 9.5cm

- Pelvic Tilt
  - 0 : PT<20°
  - + : PT 20-30°
  - ++ : PT>30°
Materials and Methods

- Percent change ASD type
- Preoperative vs. last follow up
  - NRS back and leg pain
  - Specific domains
    - SF-36
    - SRS-22r
- Domains >1 SD generational norm
  - Most impacted domains
  - Return to “normal”

<table>
<thead>
<tr>
<th>PROM Domains</th>
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<tbody>
<tr>
<td>SF-36</td>
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<tr>
<td>Physical function</td>
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<tr>
<td>Bodily pain</td>
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<tr>
<td>Role physical</td>
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<tr>
<td>General health</td>
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<tr>
<td>Vitality</td>
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<tr>
<td>Social function</td>
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<td>Role emotional</td>
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<tr>
<td>Mental health</td>
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<tr>
<td>SRS-22r</td>
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<tr>
<td>Pain</td>
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<tr>
<td>Activity</td>
</tr>
<tr>
<td>Appearance</td>
</tr>
<tr>
<td>Mental health</td>
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</tbody>
</table>
Results: All ASD Patients (n=377)

- **All ASD**
  - N = 377/582 (65%)
  - Age 57.8 years
  - ASA grade = 2.4
  - Scoliosis = 42.6°
  - SVA = 63.9mm
  - PSF = 11.7 levels
- **Pain improvement**
  - Back = 44%
  - Leg = 39%
- **Self-image = 61%**
- **Function improvement**
  - Physical = 30%
  - Social = 35%
Results: All ASD vs. Generational Norm

Greatest gains = bodily pain, self-image; no returns to normal
Results: Thoracic ASD (n=19)

- Thoracic ASD
  - Age 33.1 years
  - ASA grade = 1.7
  - Scoliosis = 47.1°
  - PSF = 11.3 levels

- Pain improvement
  - Back = 34%
  - Leg = 46%

- Self-image = 36%

- Function improvement
  - Physical = 18%
  - Social = 15%
  - Mental = 17%
Results: Thoracic ASD vs. Generational Norm

Best return to norm all groups; bodily pain, self-image
Results: Lumbar ASD (n=59)

- Lumbar ASD
  - Age 55.6 years
  - ASA grade = 2.2
  - Scoliosis = 41.4°
  - PSF = 10.7 levels

- Pain improvement
  - Back = 47%
  - Leg = 42%

- Function improvement
  - Physical = 27%
  - Social = 32%
  - Mental = 20%

- Self-image = 58%
Results: Lumbar ASD Generational Norm
Greatest gains; bodily pain, self image

- SF-36 PF: Preop 76.3, Postop 40.7
- SF-36 BP: Preop 78, Postop 40.7
- SF-36 MH: Preop 37.3, Postop 18.6, Improvement 18.7
- SF-36 SF: Preop 50.9, Postop 27.1, Improvement 23.8
- SRS-22 SI: Preop 91.4, Postop 47.5, Improvement 43.9

Legend:
- Blue: Preop percent >1SD from generational norm
- Red: Postop percent >1SD from generational norm
- Green: Improvement from pre to postop
Results: Double ASD (n=64)

- **Double ASD**
  - Age 48.5 years
  - ASA grade= 2.1
  - Scoliosis= 62.3°
  - PSF= 12.7 levels

- **Pain improvement**
  - Back= 34%
  - Leg= 23%

- **Function improvement**
  - Physical= 21%
  - Social= 27%
  - Mental= 18%

- **Self-image= 58%**
Results: Double ASD Generational Norm
Greatest gains; self image
Results: Sagittal ASD (n=97)

- Sagittal ASD
  - Age 62.9 years
  - ASA grade= 2.6
  - SVA= 109.3mm
  - Prior surgery= 77.3%
- Pain improvement
  - Back= 44%
  - Leg= 34%
- Function improvement
  - Physical= 44%
  - Social= 38%
  - Mental= 18%
- Self-image= 61%
Results: Sagittal ASD Generational Norm
Worst returns to “normal”
Results: Mixed ASD (n=138)

- Mixed ASD
  - Age 63 years
  - ASA grade= 2.5
  - Scoliosis= 48.8°
  - SVA= 103.7mm
- Pain improvement
  - Back= 49%
  - Leg= 48%
- Function improvement
  - Physical= 40%
  - Social= 40%
  - Mental= 22%
- Self-image= 68%
Results: Mixed ASD Generational Norm
Second worst returns to “normal” (behind Sagittal cohort)
Conclusions

- ASD surgery improvements
  - Back pain = 45%
  - Leg pain = 40%
  - Physical function = 30%
  - Social function = 35%
  - Self-image = 60%
  - Will NOT return to “normal”

- Improvements dependent
  - Deformity type
  - PROM domains most impacted

- Effective counseling
  - Measure radiographs
  - Classify deformity type
  - Measure PROMS

- Important implications
  - ASD PROM development
  - ASD outcomes research
Thank You