North Carolina Orthopaedic Association

2015 Annual Meeting

Reconstruction

Sunday, October 11

October 9-11, 2015 • Kiawah Island Golf Resort
Kiawah Island, South Carolina

This continuing medical education activity is jointly provided by the NCOA and the Southern Regional Area Health Education Center
Decreased Range of Motion Following Total Knee Arthroplasty Is Predicted by the Tampa Scale of Kinesiophobia

Brown ML, Plate JF, Von Thaer S, Fino NF, Smith BP, Seyler TM, Lang JE

Author disclosure is in the Final Program.

The authors have no conflicts

Range of Motion After TKA is Important

ROM associated with:
- Pain relief
- Function
- Patient satisfaction

Risk Factors for Decreased ROM following TKA:
- Previous knee surgery (Brown J CORR 2009, Scnul en J Arthroplasty 2011)
- Diabetes (Brown J CORR 2010, Scnul en J Arthroplasty 2011)
- Component malpositioning
- Non-compliance with physical therapy (Brown J Orthop Sports Phys Ther 2009)

Patient Psychology Influences Outcomes of Orthopaedic Surgery

- Fear of movement associated with increased pain and disability following spine surgery (Weller S The Spine Journal 2014)
- Psychological factors associated with return to sport following ACL reconstruction (Yercan Knee 2006, Scranton J Arthroplasty 2001)
- Lower mental component scores less likely to improve physically after TKA (Brown J CORR 2009, Brander CORR 2007, Franklin CORR 2008)

Fear-Avoidance Cognitive Behavioral Model: A Framework to Understand Chronic Pain Syndromes

Injury

Pain correctly perceived as non-threatening allows:
- Rehabilitation
- Gradual return to normal activity

Pain incorrectly perceived as threatening leads to:
- Kinesiophobia, a pain-related fear of movement
- Cycle of pain and disease
- Chronic pain and physical dysfunction

Tampa Scale of Kinesiophobia (TSK)

- 17-item questionnaire
- 4 point Likert scale
- 4 negatively worded, reversed scored questions
- TSK scores range from 17 to 68
- scores >39 indicate a high fear of movement
- Validated instrument
Purpose

Hypothesis 1: A higher TSK score, which indicates more pain-related fear of movement, would correlate with decreased ROM after primary TKA.

Hypothesis 2: Biofeedback via showing patients a clinical photograph of their operated knee in maximum passive flexion would mitigate decreased ROM after TKA in patients with higher TSK scores.

Methods

Data Collection Timeline

<table>
<thead>
<tr>
<th>Knee Range of Motion</th>
<th>Stair Photograph</th>
<th>Stair Photobiofeedback</th>
<th>Total Photograph</th>
<th>Total Photobiofeedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>PreOp</td>
<td></td>
<td></td>
<td>PostOp [days]</td>
<td></td>
</tr>
<tr>
<td>Outpatient Followup</td>
<td></td>
<td></td>
<td></td>
<td>[weeks]</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>2</td>
<td>6</td>
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<tr>
<td>2</td>
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<td></td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>26</td>
<td></td>
</tr>
</tbody>
</table>

Statistical Analysis: A linear mixed model with random intercepts and slopes for time was used to detect any association between knee ROM and TSK or viewing the clinical photograph.

Results

79 patients analyzed for correlation between TSK and knee ROM.

Subset of 60 patients included in biofeedback portion; 29 randomized to control group and 31 randomized to photograph group.

No significant differences in demographics or comorbidities between patients in control and photograph groups.

1 point increase in TSK associated with:
- 0.47° decrease in active knee flexion after TKA
- 0.66° decrease in passive knee flexion after TKA

Discussion

• Higher TSK scores predicted poorer functional outcome after TKA but no ROM data reported (Sullivan Pain 2009)
• TKA patients with kinesiophobia walked shorter distances in timed test, no difference length of stay, pROM, or pain (Doury-Panchout Eur J Phys Rehabil Med 2005)
• Significant association between increased Pain Catastrophizing Score (PCS) and poor outcome after TKA and trend towards poor outcome with higher TSK score (Riddle CORR 2010)
• Our data extends these findings and specifically highlights the association between increased TSK scores and decreased ROM following TKA.

Conclusion

• The TSK may help arthroplasty surgeons identify patients at risk for decreased ROM
• Patients with kinesiophobia should be counseled regarding increased risk of decreased ROM
• Counseling protocols have shown success in helping improve outcomes following TKA in patients with Kinesiophobia (Naylor J Am Pain Soc 2002; Monticone Arch Phys Med Rehabil 2013)

Thank You
A prospective observational study of TKA compared to PKA with respect to outcome of pain and function scores compared to preoperative Pain and function: Predictors of outcome

Michael Le MD, Michael Berend MD, Keith Berend MD, and David Mauerhan MD

Disclosures

• I have no disclosures for this talk
• Mauerhan: Board Member of American Association of Hip and Knee Surgeons, Paid consultant Biomet, Royalties from Biomet
• K. Berend: AAOS Board of Specialty Societies, Board Member of American Association of Hip and Knee Surgeons, CORR Editorial board, J of Arthroplasty Editorial board, JBJB Editorial board, Kinamed Research Support, Knee Society Board member, Orthopaedics Editorial board, Orthosensor Research support, Pacira Research Support, Reconstructive Review Editorial Board, Zimmer Biomet Royalties, Paid consultant, research support
• M. Berend: Board Member of American Association of Hip and Knee Surgeons, Biomet Royalties, Paid consultant, research support, Johnson and Johnson Research Support, Joint Replacement Surgeons of Indiana Research Foundation Research support, J of Arthroplasty Editorial Board, Orthalign Stock holder, Piedmont Ortho Board member, Stryker Research Support

Introduction

• Estimated 719,000 TKA and 30,000 PKA performed each year.
• TKA Survivorship exceeds 90% at 15-20 years (1-3)
• PKA Survivorship exceeds 90% at 15-20 years (4-8)
  – Anteromedial arthritis
• Patients with TKA are dissatisfied up to 10-15% (9-11)
  – Continued pain, reduced function or failure to meet expectations
• PKA have a failure rate 2-3 times higher than TKA within the first 5 years (NZJR)
• Revision of PKA occurs 4-6 times higher than TKA at any Oxford Knee Score (12)

Methods

• Multicenter prospective observational study
  – CMC, Center for Hip and Knee Surgery (Mooresville, IN) and Joint Implant Surgeons (New Albany, OH)
• 182 Patients enrolled from April 2011 to May 2013.
• Indications:
  – TKA: OA in 2 or 3 compartments of the knee
  – PKA: anteromedial arthritis with intact ligamentous structures and benign lateral compartment
• Exclusions:
  – Patients with Inflammatory arthritis (RA, SLE, AS)
  – Osteonecrosis: spontaneous or steroid induced
• 76 TKA and 66 PKA (142)

• Oxford Scores:
  – <26 Poor: TKA 10% and PKA 60% revision rate (NZJR)
  – 34-48 Good to excellent: 4 times Higher PKA revision than TKA (NZJR)
• 1/3 of PKA revision occurs within 1st year of index procedure (NZJR)
• Purpose: Prospectively collect patient outcome scores of TKA and PKA then analyzing factors such as Chronic pain and Psychiatric history that may affect outcomes

Outcome Measures:

• Oxford Knee Sore
• WOMAC
• SF36
• EQSD
• Assessed Preoperative and 12 months post-operatively
• Statistical Analysis:
  – Wilcoxon signed-rank test
  – T-test
**Patient Factors**

- Total Patients: 142
- Chronic Pain (15) vs No Pain (127)
  - Narcotic Medications
- Psychiatric History (5) vs No Psychiatric History (137)
  - Anxiety and Depression

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**Comparison of TKA and PKA scores**

<table>
<thead>
<tr>
<th></th>
<th>TKA (mean(SD))</th>
<th>PKA (mean(SD))</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OKS TOTAL</td>
<td>20.34(8.01)</td>
<td>18.25(8.55)</td>
<td>0.323</td>
</tr>
<tr>
<td>WOMAC Pain</td>
<td>8.04(3.46)</td>
<td>6.69(2.95)</td>
<td>0.203</td>
</tr>
<tr>
<td>WOMAC Stiffness</td>
<td>4.67(3.89)</td>
<td>2.58(1.74)</td>
<td>0.043</td>
</tr>
<tr>
<td>WOMAC Physical Function</td>
<td>23.52(12.37)</td>
<td>25.61(14.56)</td>
<td>0.078</td>
</tr>
<tr>
<td>SF36 Physical functioning</td>
<td>44.53(9.45)</td>
<td>40.46(7.44)</td>
<td>0.435</td>
</tr>
<tr>
<td>SF36 Role functioning/physical</td>
<td>38.79(12.17)</td>
<td>32.17(9.49)</td>
<td>0.017</td>
</tr>
<tr>
<td>SF36 Pain</td>
<td>32.17(13.46)</td>
<td>29.25(9.96)</td>
<td>0.130</td>
</tr>
<tr>
<td>SF36 General health</td>
<td>4.21(18.71)</td>
<td>2.58(1.86)</td>
<td>0.584</td>
</tr>
<tr>
<td>SF36 - MOBILITY</td>
<td>-0.13(0.46)</td>
<td>-0.63(0.52)</td>
<td>0.620</td>
</tr>
<tr>
<td>SF36 - SELF.CARE</td>
<td>-0.11(0.48)</td>
<td>-0.14(0.48)</td>
<td>0.746</td>
</tr>
<tr>
<td>SF36 - VITAL ACTIVITIES</td>
<td>-0.69(0.54)</td>
<td>-0.76(0.54)</td>
<td>0.327</td>
</tr>
<tr>
<td>SF36 - PAIN/COMFORT</td>
<td>-0.79(0.82)</td>
<td>-0.77(0.82)</td>
<td>0.323</td>
</tr>
<tr>
<td>SF36 - ANXIETY/DEPRESSION</td>
<td>-0.20(0.30)</td>
<td>-0.20(0.30)</td>
<td>0.449</td>
</tr>
</tbody>
</table>

Minimal Clinically important difference: 9-12 per Ehrich et al (13) and 15per Escobar et al (14)

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**Chronic Pain - Baseline**
Chronic Pain – 12 Months

Psych - Baseline

Psych – 12 Months

OKS breakdown

• Poor 0-26: 4 patients (2 TKA, 2 PKA)
  – TKA: Post traumatic Arthritis with osteomyelitis
  – TKA: Chronic Pain
  – PKA: Chronic Back Pain
• Fair 27-33: 4 patients
  – PKA: Chronic Pain
  – TKA: Chronic Pain

Complications

• 1 Re-hospitalization for postoperative anemia:
  – Admitted 6 days Post op. 79yo f with hx of Hemolytic anemia secondary to cold agglutinins. Hgb 7.4. Symptomatic with mobilization
• 1 MUA of TKA within 90 days
  – TKA on 5/25/2011 and MUA on 7/13/2011: Pt had <90 flexion at 6 weeks post op
• 1 NSTEMI 2 Months Post op (TKA)
• 1 PE (TKA) – IVC filter

Limitations

• Lack of PKA revisions in our data set
  – Strict indications
• May benefit from more patients
Conclusion

• All Pts Improved from Baseline as expected
  – When correct indications are used
• TKA Patients had significantly better improvement in WOMAC Pain score to PKA but not clinically different
• Pts with Chronic Pain start with significantly lower OKS, EQ5D Pain, and SF36 Pain.
  – Improve but not same level as Patients without Chronic Pain
• Pts with Psych History have significantly lower baseline EQ5D Anxiety/Depression and SF36 Emotional Role function scores
  – Improve but not to same level as Patients without Psychiatric Hx
• Patients with lower OKS may be multifactorial. Revision Surgery may not be beneficial if implant is stable on Exam and radiographically

Special Thanks

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• Ada Mayfield

References

Does an Enhanced Recovery Pathway Decrease Length of Stay After Total Knee Arthroplasty?

Mitchell R. Klement, M.D.; Brian T. Nickel, M.D.; W. Michael Bullock, M.D., PhD.; Alexander J. Lampley, M.D.; Thorsten M. Seyler, M.D., PhD.; Samuel S. Wellman, M.D., Michael P. Bolognesi, M.D.; Stuart M.B, CH.B.

North Carolina Orthopedic Association
October 11, 2015
Kiawah Island, SC

Background
- Total knee arthroplasty (TKA), one of the larger, and more painful orthopedic procedures, has doubled in the United States over the last decade and, with an aging population, the incidence is only expected to increase.
- In addition, growing health care financial burden places emphasis on institutions to provide high quality, cost effective care in an efficient manner for this large patient population.
- Many multimodal pain regimens have been described in attempts to reduce length of stay (LOS) but the ideal regimen is yet to be determined.

Methods
- From January 1, 2013 to October 1, 2014 three perioperative pathways have been used to address surgical pain at our institution after TKA including:
  - Femoral nerve catheter plus patient controlled analgesia (PCA) (Group 1).
  - Exparel® plus single shot femoral nerve block plus an oral analgesic protocol (Group 2).
  - Adductor canal catheter and posterior capsule single shot block plus an oral analgesic protocol (Group 3).
- Little modification has occurred in respect to surgical technique, implant choice, or post-operative physiotherapy. The primary outcome measure was length of stay and secondary outcome was patient satisfaction.

Results
- Overall, there were 134 patients in Group 1, 270 patients in Group 2, and 123 patients in Group 3.
- Patients in Group 3 who received adductor canal catheters have a lower LOS (2.29 days) and higher HCAHPS pain scores (79.8%).

Conclusions
- Based on the results in this study, the use of an adductor canal catheter and posterior capsule single shot block plus a multimodal oral analgesic protocol resulted in a lower length of stay and improved pain management scores at a large tertiary academic center.

THANK YOU
Patient Factors and Cost Associated with 90-day Readmission Following THA

Johannes F. Plate, MD, PhD; Matthew L. Brown, MD; Andrew D. Wohler, BS; Thorsten M. Seyler, MD, PhD; Jason E. Lang, MD

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2Duke University, Durham, NC

Financial Disclosure
No conflict of interest to report.

Introduction

- Projected 174% growth in total hip arthroplasty (THA) in the next 15 years
  - Kurt et al. JBB J Am 2007; Bashinskaya et al. ISRN Orthop 2012
- 570,000 THA annually in 2030
- Increased emphasis on cost control from Centers of Medicare/Medicaid (CMS)
  - Bozic et al. CORR 2014
- Value based payments
  - Episode of care and bundled payments
  - Potential for cost savings
  - Improved continuum of care
  - Improved collaboration among care team

Bundled payments

- Reimbursement for episode of care
  - No fee-for-service
  - Includes all services provided
  - Financial incentives
    - Coordinated, reliable, quality care
    - Financial risks
  - Readmission costs
    - Increase with severity of illness (SOI)

Adjusted reimbursement models

- Diagnostic related group-severity of illness (DRG-SOI)
  - Patient primary diagnosis and co-morbidities
  - 1-4 minor to extreme SOI
  - Higher SOI
    - Readmission rates up to 26%
    - Increased readmission cost
    - Higher financial burden for complex patients
  - Limited data on actual reimbursement for readmissions and revisions

Purpose

- Identify specific areas of care for cost savings during unplanned readmissions

Hypothesis

- Increased readmission costs with higher SOI
- Increased actual reimbursement with higher SOI
Materials and Methods

- Retrospective review of all primary total hip arthroplasties (THA) 2005 – 2012
- Identify patients with 90-day readmission
- Patient demographics
- DRG-SOI, co-morbidities
- Hospital billing system query
- Emergency department
- Evaluations and consultations
- General hospital costs
- Imaging and diagnostic studies
- Laboratory studies
- Medications and transfusions
- Operating room costs
- ANOVA, t-test with alpha 0.05

Results

- 1781 primary THA in 7-year period
  - 139 readmissions (8.93%) in 90 days after surgery

Table 1. Patient Demographics

<table>
<thead>
<tr>
<th>Gender</th>
<th>N (%)</th>
<th>Mean Age (SD), years</th>
<th>Age Group N (%)</th>
<th>Mean BMI (SD), kg/m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>49 (41)</td>
<td>62.6 (15.4)</td>
<td>&lt;60</td>
<td>51 (43)</td>
</tr>
<tr>
<td>Female</td>
<td>71 (59)</td>
<td>67.1 (13.8)</td>
<td>&gt;60-70</td>
<td>28 (23)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;70-80</td>
<td>20 (16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&gt;80</td>
<td>20 (16)</td>
</tr>
</tbody>
</table>

Mean BMI (SD), kg/m²: 25.54 (5.30)

Costs and Reimbursement

<table>
<thead>
<tr>
<th>Readmission Reason</th>
<th>Total Cost</th>
<th>Admission</th>
<th>Emergency</th>
<th>Diagnostic</th>
<th>Evaluation</th>
<th>Labs</th>
<th>Transfusions</th>
<th>Medical</th>
<th>Supplies</th>
<th>Surgeons</th>
<th>Contractors</th>
<th>Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip Infection</td>
<td>$11,792</td>
<td>$9,090</td>
<td>$2,400</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$3,993</td>
</tr>
<tr>
<td>Dislocation</td>
<td>$10,911</td>
<td>$8,582</td>
<td>$2,329</td>
<td>$1,482</td>
<td>$414</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$3,853</td>
</tr>
<tr>
<td>Hardware Failure</td>
<td>$9,741</td>
<td>$7,583</td>
<td>$2,158</td>
<td>$1,064</td>
<td>$1,987</td>
<td>$8</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$3,369</td>
</tr>
<tr>
<td>Wound Complication</td>
<td>$8,322</td>
<td>$6,534</td>
<td>$1,788</td>
<td>$1,472</td>
<td>$427</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$3,069</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>$7,656</td>
<td>$5,906</td>
<td>$1,750</td>
<td>$1,064</td>
<td>$1,987</td>
<td>$8</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$2,766</td>
</tr>
<tr>
<td>Hardware Failure</td>
<td>$7,384</td>
<td>$5,776</td>
<td>$1,608</td>
<td>$1,342</td>
<td>$392</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
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<td>$0</td>
<td>$0</td>
<td>$2,592</td>
</tr>
<tr>
<td>Periprosthetic Fracture</td>
<td>$6,500</td>
<td>$5,100</td>
<td>$1,400</td>
<td>$1,064</td>
<td>$1,987</td>
<td>$8</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$2,256</td>
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<tr>
<td>Other</td>
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<td>$3,400</td>
<td>$920</td>
<td>$704</td>
<td>$676</td>
<td>$0</td>
<td>$0</td>
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<td>$0</td>
<td>$1,466</td>
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</table>

Grand Total: $2,623,113

Significant difference in average hospital costs (p=0.012)

Costs by DRG-SOI

<table>
<thead>
<tr>
<th>SOI</th>
<th>General</th>
<th>Emergency</th>
<th>Evaluation</th>
<th>Postoperative</th>
<th>Reimbursement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$7,400</td>
<td>$895</td>
<td>$176</td>
<td>$3,245</td>
<td>$346</td>
</tr>
<tr>
<td>2</td>
<td>$13,462</td>
<td>$378</td>
<td>$2,250</td>
<td>$2,051</td>
<td>$1,008</td>
</tr>
<tr>
<td>3</td>
<td>$20,462</td>
<td>$560</td>
<td>$2,460</td>
<td>$1,448</td>
<td>$2,158</td>
</tr>
<tr>
<td>4</td>
<td>$21,933</td>
<td>$648</td>
<td>$2,460</td>
<td>$1,448</td>
<td>$2,158</td>
</tr>
</tbody>
</table>

Significant correlation between increasing SOI and hospital costs (p<0.05)
Route of Admission

<table>
<thead>
<tr>
<th>Route</th>
<th>Total</th>
<th>Emergency</th>
<th>Total</th>
<th>Labor</th>
<th>Transfusion</th>
<th>Meds, Transfusions</th>
<th>OR Costs</th>
<th>IMAGING, DIAGNOSTIC STUDIES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Department</td>
<td>$15,087</td>
<td>$588</td>
<td>$13,697</td>
<td>$6,532</td>
<td>$3,102</td>
<td>$2,812</td>
<td>$1,139</td>
<td>$4,002</td>
<td>$18,271</td>
</tr>
<tr>
<td>Clinic</td>
<td>$18,271</td>
<td>$588</td>
<td>$13,697</td>
<td>$6,532</td>
<td>$3,102</td>
<td>$2,812</td>
<td>$1,139</td>
<td>$4,002</td>
<td>$18,271</td>
</tr>
<tr>
<td>Outside hospital or</td>
<td>$25,275</td>
<td>$0</td>
<td>$25,275</td>
<td>$7,051</td>
<td>$1,190</td>
<td>$1,907</td>
<td>$15,259</td>
<td>$1,610</td>
<td>$25,275</td>
</tr>
<tr>
<td>rehabilitation units (n=10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>$68,633</td>
<td>$1,186</td>
<td>$67,447</td>
<td>$14,302</td>
<td>$5,035</td>
<td>$4,736</td>
<td>$21,578</td>
<td>$24,423</td>
<td>$68,633</td>
</tr>
</tbody>
</table>

- 3 routes of admission
  - Emergency department (N=100)
  - Clinic (n=49)
  - Transfers from outside hospitals or inpatient units (n=10)

- Median SOI for patients transferred from outside hospital or inpatient rehabilitation was 3 compared to a median SOI of 2 for patients that were admitted from the ED or clinic (p=0.193).

Insurance

- 98 readmissions Medicare/Medicaid
- 41 readmissions private payers

- Readmission costs
  - Medicare/Medicaid $14,967
  - Private payers $15,032, p=0.975
  - Fee-for-service reimbursement
  - Mean net loss $2.643 Medicare/Medicaid
  - Mean net gain $76.28 private payers

Discussion

- Most readmissions for surgical reasons
- Higher cost compared to medical reasons
- Highest mean readmission costs
- Hardware failure
- Infection
- Pneumonia.
- Significant correlation between increasing SOI and increasing costs for physician evaluation, imaging, laboratory workup, medication and transfusions, and overall hospital cost.
- Direct transfers from outside hospitals or inpatient rehabilitation significantly higher overall hospital costs and OR costs
- Higher SOI

- Overall reimbursement 83%
- Medical reasons 87%
- Surgical reasons 82%
- Lower reimbursement for Medicare/Medicaid
- Expected bundled payments for private insurance
- Importance of payer-mix in the future

Discussion

- Post-acute care setting
- Inpatient rehabilitation, skilled nursing facility, home health
- Higher readmission costs for patient transfers from inpatient rehab
  - Incentives for discharge home

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Vancomycin Administration in Penicillin Allergic Patients Undergoing Total Joint Arthroplasty

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Michael Ruffalo MD,
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North Carolina Orthopaedic Association
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Disclosures
• We have nothing to declare for this study

Background
• Perioperative antibiotic prophylaxis important for prevention of PJI
• PCN allergy is often reported by patients
• Alternative antibiotics are frequently given instead of a cephalosporin
• Protocols vary by institution
• Literature regarding efficacy of alternative abx are variable

Purpose
To determine if PCN or cephalosporin allergic patients who received vancomycin monotherapy are at an increased risk of developing PJI compared to non-PCN allergic patients receiving cefazolin.

Methods
• Multi-institutional retrospective review (n=11523)
• PCN allergic receiving vancomycin vs. non-PCN allergic receiving cefazolin
• Exclusion criteria: multiple abx, unavailable abx info, or other abx
• PJI was identified using ICD9 codes and confirmed by manual review
• Multivariate analysis performed
Results

- No difference in Overall PJI rate (OR 0.9; p=0.54)
  - PCN allergic: 1.6% (48/2937)
  - Non PCN allergic: 1.8% (152/8386)

  - Organism profile varied
    - PCN allergy group had more gram negatives, but fewer antibiotic resistant PJs and gram positives

Limitations

- Retrospective nature
- Additional abx in PCN allergic pts not evaluated
- Acute vs. chronic PJI not distinguished

Conclusions

- No difference in rate of PJI in both groups
- A higher rate of gram negatives PJI in Vancomycin group
  - decreased resistant organisms
- Future studies needed to determine optimal abx in PCN allergic patients

THANK YOU.
Alarming National Obesity Trends in Revision Total Knee Arthroplasty
Susan Odum, PhD
Bryce Van Doren, MPA, MPH
Bryan Springer, MD

Introduction
• Rate of total knee arthroplasty (TKA) procedures is increasing in parallel with population obesity rates
• As the average age of TKA patients decreases, the proportion of obese primary TKA patients increases.
• 69% of index TKA patients remain at the same preoperative weight thus obesity remains risk factor at revision

Purpose
To determine the national trends of obesity rates among revision TKA patients in the U.S over the last decade.

Methods
• Weighted data from 2002-2012 releases of the Nationwide Inpatient Samples were analyzed.
• Identified patients undergoing rTKA using ICD-9 procedure codes for unspecified component(s) (81.55), all components (00.80), tibial component (00.81), femoral component (00.82), patellar component (00.83), and liner exchanges (00.84).
• Patients classified as obese or non-obese using AHRQ obesity comorbidity indicator

Results
• The rate of obesity among revision TKA patients more than doubled between 2002 and 2012.
• Adjusting for patient demographics and facility characteristics, the odds of obesity in rTKA more than quadrupled during this time period.
• The multivariate analysis also shows a steady incline with the largest incremental increase occurring between 2007 and 2008.
Results

<table>
<thead>
<tr>
<th>Year</th>
<th>Adjusted Odds Ratio</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>1.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2003</td>
<td>1.12</td>
<td>1.02-1.24</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2004</td>
<td>1.11</td>
<td>1.00-1.23</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2005</td>
<td>1.25</td>
<td>1.13-1.38</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2006</td>
<td>1.51</td>
<td>1.37-1.68</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2007</td>
<td>1.55</td>
<td>1.41-1.72</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2008</td>
<td>3.60</td>
<td>3.26-3.97</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2009</td>
<td>3.95</td>
<td>3.58-4.36</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2010</td>
<td>4.80</td>
<td>4.44-5.19</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2011</td>
<td>4.13</td>
<td>3.74-4.55</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>2012</td>
<td>4.52</td>
<td>4.10-4.99</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Conclusion

• Obesity rate among revision TKA patients is increasing at an alarming rate and outpaces that of index TKA patients.
• Revision TKA is not considered elective.
• The best opportunity for BMI reduction occurs prior to the index procedure.
• To give patients an advantage for a good outcome, surgeons need to optimize their patients prior to the index TKA.

Thank you
Incidence of heterotopic ossification in direct anterior vs. posterior approach to total hip arthroplasty: a retrospective radiographic review

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Department of Orthopaedic Surgery, Wake Forest School of Medicine, Medical Center Boulevard, Winston-Salem, NC 27157

Purpose
To investigate the incidence of heterotopic ossification (HO) following direct anterior approach total hip arthroplasty (DAA) compared to posterior approach, performed by a single surgeon at one institution

Methods
- Primary THAs performed by the senior author (JEL) over a 70-month period were reviewed
- 235 DAA THAs and 120 posterior THAs
- The following data was collected: surgical approach, gender, age at time of operation, race, BMI, comorbidities, pre-operative diagnosis, type of osteoarthritis (atrophic vs. normotrophic vs. hypertrophic), ASA classification, blood loss, operative time, number of blood transfusions required, length of hospital stay, and DVT prophylaxis received
- Mean time of follow up: 2.04 years (range 0.5-11.6 years)
- HO graded based on the standard Brooker classification system
- To assess differences in observed rates of HO and clinically significant HO, independent study measures were analyzed using logistic regression. Estimates for odds ratios and corresponding 95% confidence intervals were generated.

Introduction
- HO - common complication following THA, leading to hip pain and decreased range of motion
- Pathogenesis of HO - not fully understood. It has been proposed that trauma to soft tissues is an inciting event
- A potential advantage of the DAA is that it permits less soft tissue trauma during surgery compared to the posterior approach

Direct Anterior Approach

Conflict of Interest
The authors have no relevant conflict of interest with regards to this study to declare

Conflict of Interest
The authors have no relevant conflict of interest with regards to this study to declare
Cohort operative parameters/demographics comparison

<table>
<thead>
<tr>
<th>Variable</th>
<th>Anterior Approach (n=235)</th>
<th>Posterior Approach (n=120)</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age (SD)</td>
<td>62.8 ± 12.3 years</td>
<td>58.5 ± 13.5 years</td>
<td>p = 0.002</td>
</tr>
<tr>
<td>Female</td>
<td>54.0%</td>
<td>57.1%</td>
<td>ns</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>28.6 ± 5.1 kg/m²</td>
<td>34.2 ± 9.2 kg/m²</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>0.4%</td>
<td>5.8%</td>
<td>p &lt; 0.003</td>
</tr>
<tr>
<td>Diabetes</td>
<td>6.0%</td>
<td>15.6%</td>
<td>p &lt; 0.003</td>
</tr>
<tr>
<td>Hypertension</td>
<td>46.4%</td>
<td>62.5%</td>
<td>p &lt; 0.02</td>
</tr>
<tr>
<td>DVT Prophylaxis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fondaparinux</td>
<td>98.7%</td>
<td>99.2%</td>
<td>ns</td>
</tr>
<tr>
<td>Aspirin</td>
<td>0.4%</td>
<td>15.8%</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Warfarin</td>
<td>86.0%</td>
<td>62.1%</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>Enoxaparin</td>
<td>11.1%</td>
<td>10.8%</td>
<td>ns</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>11.1%</td>
<td>43.1%</td>
<td>p &lt; 0.0001</td>
</tr>
<tr>
<td>Heparin</td>
<td>2.1%</td>
<td>3.2%</td>
<td>ns</td>
</tr>
<tr>
<td>DVT Prophylaxis</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
</tbody>
</table>

Discussion

- Patients who underwent DAA were significantly less likely to develop clinically significant (Brooker Grade 3 or Grade 4) HO when compared to posterior approach.
- Reasoning: DAA depends more on intermuscular planes for dissection which ultimately incites less local trauma.
- Tippets et al, 2014:
  - Retrospective radiographic review of the incidence of HO in 236 DAA THAs performed by 3 different surgeons in 2 different institutions.
  - Overall incidence of HO following DAA was 41.5% (8.1% Brooker grade 3 and 1.3% Brooker grade 4).
  - Conclusion: DAA does not protect against the development of HO when compared to other surgical approaches.

Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Comparison</th>
<th>Odds Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach</td>
<td>Anterior approach</td>
<td>0.36 (0.13, 0.96)</td>
<td>0.041</td>
</tr>
<tr>
<td>DVT prophylaxis</td>
<td>Fondaparinux</td>
<td>0.92 (0.11, 7.53)</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Aspirin</td>
<td>0.25 (0.09, 0.68)</td>
<td>0.0064</td>
</tr>
<tr>
<td></td>
<td>Warfarin</td>
<td>4.1 (3.2, 7.5)</td>
<td>0.014</td>
</tr>
<tr>
<td></td>
<td>Enoxaparin</td>
<td>2.38 (0.86, 6.67)</td>
<td>0.096</td>
</tr>
<tr>
<td></td>
<td>Clopidogrel</td>
<td>7.1 (1.6, 33.3)</td>
<td>0.009</td>
</tr>
</tbody>
</table>

Odds ratios for developing clinically significant heterotopic ossification

Conclusion

- This study expands the limited data available on the incidence of HO following DAA THAs.
- This may be instructive when approaching THA candidates with conditions that predispose them to the development of HO, such as hypertrophic OA or ankylosing spondylitis.

Limitations

- Retrospective review
- Patients were not randomized to surgical approach arms of study
- Observer bias. Observer not blinded to surgical approach

Thank you
Complications are not Increased after MoM Acetabular Revision Compared to MoP Acetabular Revision

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Samuel S. Wellman, MD
Michael P. Bolognesi, MD
Paul F. Lachiewicz, MD

Duke University       Department of Orthopaedic Surgery

Isolated Revision of Acetabular Component

- Decreased blood loss, surgical time, and complications compared to both component
- Risk of dislocation: up to 20%
- Metal-on-metal (MoM) revisions reported to have greater risk of complications, due to adverse local tissue reaction

Jones, Lachiewicz. JBJS 2004
Lawless et al. Clin Orthop 2010

MoM pseudotumor

Study questions

1. Are there demographic differences in patients undergoing revision for failed MoM compared to MoP bearing surfaces?
2. Are there differences in early medical or wound complications after isolated acetabular revision of MoM compared to MoP?
3. Are there differences in the frequency of dislocation, deep infection, and re-revision based on the original bearing surface?

Materials and Methods

- Review of 100% Medicare database; PearlDiver®
- MoM THA, then acetabular revision: 474 hips (474 pts)
- MoP THA, then acetabular revision: 672 hips
- 2005-2010 cohorts, complications tracked until 2012
- Minimum follow-up time: 2 years
- 30-day, 90-day, 1-year, 2-year, and overall
- ICD-9 and CPT codes

Bozic, Lau et al. J Arthroplasty 2012

Demographics

- Gender
- Age by range
  - 65, 65-69, 70-74, 75-79, 80-84, >85
- Charlson Comorbidity Index

Charlson et al. J Chronic Diseases 1987
Complications

Early medical/wound:
- DVT
- Myocardial infarction
- Heart failure
- UTI
- Bleeding
- Anemia
- Wound complication
- Cellulitis
- Transfusions

Major surgical:
- Dislocation
- Deep infection
- Re-revision

Statistical Analyses

- Chi-square test (p-value < 0.05 for significance)
- Values between 1-10 not provided by database, estimated to be 5 Fisher’s exact test
- Odds ratios (OR), 95% Confidence intervals (CI)

Acknowledgement: Dr Cindy Green, Duke CRU

Results

Demographics: Gender

- Higher proportion of females than males in the MoP acetabular revision cohort

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Isolated acetabular revision of MoM</th>
<th>Isolated acetabular revision of MoP</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>474</td>
<td>672</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>269 (60.97%)</td>
<td>452</td>
<td>0.700</td>
<td>0.595-0.971</td>
<td>0.028</td>
</tr>
<tr>
<td>Male</td>
<td>174 (39.03%)</td>
<td>208</td>
<td>1.294</td>
<td>1.039-1.598</td>
<td>0.042</td>
</tr>
<tr>
<td>Unknown</td>
<td>14 (2.95%)</td>
<td>12</td>
<td>1.793</td>
<td>0.767-4.692</td>
<td>0.191</td>
</tr>
</tbody>
</table>

Demographics: Age

- Higher proportion of older patient groups in the MoP than MoM acetabular revision cohort

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Isolated acetabular revision of MoM</th>
<th>Isolated acetabular revision of MoP</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>474</td>
<td>672</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 65</td>
<td>98</td>
<td>94</td>
<td>1.362</td>
<td>0.890-2.178</td>
<td>0.197</td>
</tr>
<tr>
<td>65-84</td>
<td>99</td>
<td>97</td>
<td>1.400</td>
<td>0.949-2.028</td>
<td>0.102</td>
</tr>
<tr>
<td>75-76</td>
<td>110</td>
<td>148</td>
<td>2.217</td>
<td>1.081-4.540</td>
<td>0.089</td>
</tr>
<tr>
<td>65-84</td>
<td>98</td>
<td>94</td>
<td>1.400</td>
<td>0.949-2.028</td>
<td>0.102</td>
</tr>
<tr>
<td>85 and over</td>
<td>25</td>
<td>26</td>
<td>0.864</td>
<td>0.457-1.661</td>
<td>0.399</td>
</tr>
<tr>
<td>Unknown</td>
<td>16</td>
<td>17</td>
<td>1.072</td>
<td>0.779-1.502</td>
<td>0.706</td>
</tr>
</tbody>
</table>

Charlson Comorbidity Index

- Identical mean and median CCI
- MoP had larger range

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Isolated acetabular revision of MoM</th>
<th>Isolated acetabular revision of MoP</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>474</td>
<td>672</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Std Dev</td>
<td>4.17</td>
<td>5.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>1-35</td>
<td>1-89</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Early Medical/Wound Complications

- No differences in VTE, wound complications
- Blood transfusions more common in revisions of MoP

<table>
<thead>
<tr>
<th>Complication</th>
<th>MoM (%)</th>
<th>MoP (%)</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVT</td>
<td>35 (8.50)</td>
<td>38 (5.64)</td>
<td>0.892</td>
<td>0.543-1.440</td>
<td>0.557</td>
</tr>
<tr>
<td>PE</td>
<td>5 (0.26)</td>
<td>7 (0.45)</td>
<td>1.422</td>
<td>0.409-4.344</td>
<td>0.357</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>5 (0.26)</td>
<td>6 (0.45)</td>
<td>1.467</td>
<td>0.559-3.801</td>
<td>0.499</td>
</tr>
<tr>
<td>Heart failure</td>
<td>40 (9.60)</td>
<td>62 (9.26)</td>
<td>1.563</td>
<td>0.909-2.642</td>
<td>0.107</td>
</tr>
<tr>
<td>Unmyocardial infarction</td>
<td>12 (2.89)</td>
<td>30 (4.45)</td>
<td>1.990</td>
<td>0.749-5.248</td>
<td>0.346</td>
</tr>
<tr>
<td>Bleeding complications</td>
<td>12 (2.64)</td>
<td>15 (2.23)</td>
<td>1.824</td>
<td>0.523-5.909</td>
<td>0.499</td>
</tr>
<tr>
<td>Postoperative anemia</td>
<td>57 (12.51)</td>
<td>77 (11.51)</td>
<td>1.408</td>
<td>0.869-2.240</td>
<td>0.148</td>
</tr>
<tr>
<td>Wound complications</td>
<td>33 (7.24)</td>
<td>38 (5.64)</td>
<td>1.336</td>
<td>0.552-3.237</td>
<td>0.650</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>35 (7.86)</td>
<td>48 (7.14)</td>
<td>1.372</td>
<td>0.877-2.132</td>
<td>0.152</td>
</tr>
<tr>
<td>Transfusions</td>
<td>247 (53.32)</td>
<td>250 (37.26)</td>
<td>0.793</td>
<td>0.580-1.097</td>
<td>0.030</td>
</tr>
</tbody>
</table>
Results

Hip Dislocation

- No difference in dislocation after isolated acetabular revision between MoM and MoP
  76 of 474 MoM 16.03% vs 118 of 672 MoP 17.56% at 2 years

<table>
<thead>
<tr>
<th>Complication</th>
<th>Time point</th>
<th>MoM # (%)</th>
<th>MoP # (%)</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dislocation</td>
<td>30 day</td>
<td>33 (3.3)</td>
<td>33 (3.2)</td>
<td>1.00</td>
<td>0.515-1.887</td>
<td>0.965</td>
</tr>
<tr>
<td></td>
<td>90 day</td>
<td>37 (5.7)</td>
<td>32 (4.7)</td>
<td>1.16</td>
<td>0.724-2.045</td>
<td>0.481</td>
</tr>
<tr>
<td></td>
<td>5 year</td>
<td>63 (12.7)</td>
<td>99 (14.3)</td>
<td>0.62</td>
<td>0.456-0.829</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>2 year</td>
<td>76 (14.0)</td>
<td>118 (17.6)</td>
<td>0.39</td>
<td>0.284-0.529</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>overall</td>
<td>87 (18.5)</td>
<td>117 (20.9)</td>
<td>0.87</td>
<td>0.705-1.084</td>
<td>0.035</td>
</tr>
</tbody>
</table>

Deep Infection

- No difference in deep infection after isolated acetabular revision between MoM and MoP

<table>
<thead>
<tr>
<th>Complication</th>
<th>Time points</th>
<th>MoM # (%)</th>
<th>MoP # (%)</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Infection</td>
<td>30 day</td>
<td>5 (1.00)</td>
<td>12 (2.23)</td>
<td>0.40</td>
<td>0.169-1.294</td>
<td>0.134</td>
</tr>
<tr>
<td></td>
<td>90 day</td>
<td>26 (3.8)</td>
<td>59 (8.7)</td>
<td>0.50</td>
<td>0.289-1.207</td>
<td>0.144</td>
</tr>
<tr>
<td></td>
<td>1 year</td>
<td>33 (4.7)</td>
<td>63 (9.38)</td>
<td>0.70</td>
<td>0.440-1.109</td>
<td>0.153</td>
</tr>
<tr>
<td></td>
<td>2 year</td>
<td>48 (7.0)</td>
<td>71 (10.6)</td>
<td>0.80</td>
<td>0.556-1.302</td>
<td>0.027</td>
</tr>
<tr>
<td></td>
<td>overall</td>
<td>60 (12.4)</td>
<td>95 (14.1)</td>
<td>0.67</td>
<td>0.597-1.262</td>
<td>0.252</td>
</tr>
</tbody>
</table>

Re-revision

- No difference in re-revision after isolated acetabular revision between MoM and MoP

<table>
<thead>
<tr>
<th>Complication</th>
<th>Time points</th>
<th>MoM # (%)</th>
<th>MoP # (%)</th>
<th>OR</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-revision</td>
<td>30 day</td>
<td>18 (2.08)</td>
<td>29 (3.52)</td>
<td>0.68</td>
<td>0.404-1.104</td>
<td>0.704</td>
</tr>
<tr>
<td></td>
<td>90 day</td>
<td>29 (4.32)</td>
<td>46 (6.95)</td>
<td>0.77</td>
<td>0.416-1.443</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>1 year</td>
<td>82 (13.08)</td>
<td>96 (14.29)</td>
<td>0.90</td>
<td>0.640-1.273</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>2 year</td>
<td>82 (17.56)</td>
<td>121 (18.01)</td>
<td>0.93</td>
<td>0.670-1.297</td>
<td>0.756</td>
</tr>
<tr>
<td></td>
<td>overall</td>
<td>105 (22.15)</td>
<td>148 (22.82)</td>
<td>1.00</td>
<td>0.750-1.337</td>
<td>0.959</td>
</tr>
</tbody>
</table>

Study Limitations

- Administrative database reliant on coders
- No path or operative reports, or radiographs
- Length of follow Up minimum 2 yr
- 8 year database
- HIPPA compliance
  - No exact data when numbers >0 and <11

Study Strengths

- Medicare database contains 100% of inpatient and outpatient administratively coded data
- Large cohort sizes (474 MoM, 672 MoP)

Discussion

Cohort demographics

- MoP revision patients were more likely to be female and in older age groups
- Surgical selection bias or increased failure of MoM in younger, male patients? Both reasons?
Discussion

Early Complications

- Higher rates of blood transfusion in MoP revision cohort despite no difference in anemia or bleeding complication codes
- Lower transfusion threshold in population skewed toward older females?

Discussion

Hip dislocation

- High rate of dislocation in both cohorts but no difference between the isolated acetabular revisions of MoM and MoP
- Near the upper range of published reports for isolated acetabular revision
- No data on head sizes used

Jones and Lachiewicz  J Bone Joint Surg  2004

Discussion

Deep Infection

- High rate of deep infection in both groups (9.70% MoM vs 10.86% MoP)
- Similar deep infection rate (8.1%) at 3 year mean follow up reported after revision of MoM at one institution
- No difference between revisions of MoM and MoP


Discussion

Re-revision

- Rates of re-revision were also very high in both cohorts
- But no statistically significant difference based on the original bearing surface

Conclusions

Isolated Acetabular Revision of MoM and MoP components

- High rates of dislocation, deep infection, and re-revision in both cohorts
- No differences between cohorts in complications
- Greater risk of transfusion in MoP cohort
- Additional follow-up required (multi-center study)
Dual Mobility Liners For Revision Total Hip Arthroplasty Decrease Early Postoperative Instability


Cleveland Clinic Foundation, Cleveland, OH
OrthoCarolina, Charlotte, NC
Carolinas Medical Center, Charlotte, NC

Disclosure

None of the authors have received anything of interest relative to this investigation.

Revision Total Hip Arthroplasty

- Revision burden for THA
  - 17.5% from 1990-2002
  - Primary THA- increase 69%
  - Revision THA- increase 79%
- Cost
  - 1% decrease in rTHA burden
  - Could save $42.5-$112.6 million


Epidemiology of Revision THA

- Dislocation
  - One of the leading causes of revision
  - Reported as high as 28%
- Risk factors:
  - Revision THA
  - Abductor deficiency
  - AVN, EtOH, Hip Fracture
  - Neuromuscular Disorders
  - Obesity

Bozic et al. The Epidemiology of Revision Total Hip Arthroplasty in the United States. JBJS 2009;91:128-33

Enhancing Stability in High Risk Patients

- Optimize component position
- Surgical approach
- Minimize extra-articular impingement
- Maximize femoral offset
- Large diameter femoral heads
  - Risk polyethylene fatigue

Dual-Mobility Bearings
- Approved for use in U.S. in 2009
  - Developed dual-articulating design
  - Maintains principle of increased jump-distance
  - Maintains principle of thick, highly cross-linked polyethylene

Gilles Bousquet (1936-1996)
Purpose

- To evaluate early dislocation rates and complications in patients who underwent rTHA
- With the Modular Dual Mobility X3 (MDM)

Methods

- Retrospective chart review at 2 high-volume centers
- rTHAs with MDM X3 between 2011 and 2015
- Minimum follow-up of 90 days

Indications for revision surgery:
- Infection
- Pain
- Recurrent instability
- Aseptic loosening
- Avascular necrosis
- Arthrodesis take down
- Periprosthetic fracture
- Component malposition

Methods

- Primary Outcome
  - Dislocation rate
  - Other complications
    - Fracture
    - Infection
- Secondary Outcomes
  - Demographic data
  - Statistics performed using JMP 11 software (Cary, NC)

Results

- Sex: 44% Male, 56% Female
- Avg age: 65 ± 15 years
- Avg ASA: 2.80
  - ASA in post-op instability compared to stable hips (3.3, p=0.03)
- Mean number of revisions: 1.16
- Mean follow-up: 555 ± 327 days
- MDM off-label use
  - 48/118 rTHA (40.6%)

Results

- Aseptic Loosening
  - 2 (1.7%)
- Infection
  - 8 (6.8%)
- Periprosthetic fracture
  - 2 (1.7%)

Primary Outcomes

- 20 of 118 rTHA (14.5%) sustained complications
  - 17 patients
- Overall Dislocation Rate 5.9% (7 of 118)
  - 5 cases of early dislocation (4.2%)
    - 1 intraprosthetic dislocation (0.8%)
  - No significance of off-label use
  - Only 1 of 7 pts with dislocations was revised to MDM for instability
Dislocation remains a problem in the early postoperative period in revision THA.

Use of the dual mobility components in revision surgery shows encouraging results:
- Early postoperative instability rate of 5.9%
  - vs current literature with rTHA early postop dislocation rates as high as 28%.

Further study in patient risk factors for dislocation following rTHA is needed:
- To best select candidate for dual mobility liners
- Dual mobility vs Constrained Liner

Longer follow up is needed:
- Adverse events
  - Polyethylene wear etc
  - Long-term stability

Thank You
Nasal decolonization of *S. Aureus* Reduces the Risk of Surgical Site Infections in TJA Patients: A Meta-Analysis

**Bryce A. Van Doren, MPA, MPH**
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Michael D. Baratz, MD
Bryan D. Springer, MD

**Disclosures**

• I have no conflicts of interest to disclose.

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**Introduction**

• Surgical Site Infections (SSIs)
  – One of the most serious complications of total joint arthroplasty (TJA)
  – Occurs in 1-2% of TJA patients
  – ↑ Morbidity and mortality
    - 1-3% mortality, 2-11x risk of death
  – $560 million in annual health care expenditure

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**Introduction**

• *Staphylococcus aureus* (*S. aureus*)
  – Connection between nasal colonization by *S. aureus* and SSIs first established in 1959
  – The majority of SSIs in TJA are caused by *S. aureus*

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**Research Question & Purpose**

➢ Determine the efficacy of MRSA screening and decolonization to reduce SSIs in TJA patients using pooled data and meta-analysis methods
Methods

- Performed meta-analysis on articles published between April 1999 and September 2015
  - Searched PubMed, PMC, Science Direct, and Web of Science
  - Additional searches of reference lists, electronic journal indices and ResearchGate

- Inclusion Criteria:
  1. Active surveillance or empiric nasal decolonization with mupirocin (may also utilize chlorhexidine and/or targeted vancomycin decolonization in addition to mupirocin)
  2. Patients underwent total joint arthroplasty
  3. SSIs was reported as an outcome
  4. Outcome was compared to concurrent or historical control group

Results

- Collectively, the 16 studies represent 56,711 patients undergoing TJA
  - 43.5% (n=24,669) decolonization protocol group
  - 52.16% (n=20,418) untreated controls

- 14 studies – active surveillance + selective decolonization (92.7% of treated patients)
  - 6 Studies → PCR
  - 8 Studies → Cell Culture

- 2 studies – universal decolonization (no screening)

Nasal decolonization resulted in a 54.6% decrease in the risk of SSI compared to controls (p<0.001)

Discussion

- This meta-analysis demonstrated that nasal decolonization is an effective tool for prevention of SSIs in TJA
  - 54.6% reduction in risk of SSI

- No difference between active surveillance/ selective decolonization and universal protocols

- These programs do not eliminate SSIs entirely
  - Issues with patient compliance and recolonization
References


Acknowledgements

• Special thanks to my co-authors
The Effect of a Door Alarm on Decreasing Operating Room Traffic in Total Joint Arthroplasty

Scott Eskildsen MD
Daniel Del Gaizo MD
UNC Orthopaedics

Disclosures
• None

Background
• Altering surrounding parameters like opening the operating room doors and foot traffic can change the dynamics of unidirectional airflow pattern.
• This may increase air turbulence, which has been associated with a faster spread of airborne organisms.
• Door Openings also correlate with increased foot traffic.

Background
• Door Openings in Orthopaedic Trauma Surgery - Andersson et al. Am. J. of Infection Control 2012

Methods
• Door Counter alone for 50 cases
• Alarm placed for an Additional 50 cases
  • 2 beat chime, every 5 seconds
• Only primary arthroplasty cases were recorded
• Data recorded consecutively over 39 operative days

Background
• Smith et al. Journal of Arthroplasty 2013
  • 2 sterile basins placed in the OR inside and out of the laminar flow
  • Increased contamination with Door Openings
• Andersson et al. Am. J. of Infection Control 2012
  • strongly positive correlation between the total contamination and total traffic flow per operation
Methods

Door Counter

Door Alarm

Results

Increases at a factor of 1.01 openings/min

<table>
<thead>
<tr>
<th>Group</th>
<th>No Alarm</th>
<th>Alarm</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Openings per Minute</td>
<td>0.53 ± 0.09</td>
<td>0.42 ± 0.09</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Seconds Open per Opening</td>
<td>9.84 ± 0.63</td>
<td>9.35 ± 0.59</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Minutes Door Open per Case</td>
<td>14.45 ± 3.32</td>
<td>10.81 ± 2.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Percentage of Case Door Ajar</td>
<td>8.65% ± 1.5</td>
<td>6.63% ± 1.6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Case Minutes</td>
<td>167.68 ± 25.12</td>
<td>165.98 ± 24.55</td>
<td>P=0.733</td>
</tr>
</tbody>
</table>
Limitations

- Not Randomized
- Staff Awareness
- Did we discourage necessary openings?
- Balance between effectiveness and mutiny

Conclusions

- The use of an alarm can decrease door openings and ultimately the risk for surgical site infection.
- The effect is subject to tolerance and may not result in the elimination of unnecessary operating room traffic long-term.
- Continuing education and awareness may be necessary to maintain these results.