Vitamin D Deficiency and Osteoarthritis Is there a link?
Presenter: Christine Schutz
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• Surgeons at Wakefield Orthopaedic Clinic Campbell. D and Lewis P.
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Vit D and Progressive OA study?

- Objective: To examine a consecutive cohort of subjects undergoing primary knee replacement for Osteoarthritis and investigate serum concentrations of 25(OH)D
- Progressive OA as defined by XRay and other joint surgery for OA at 1 year post surgery and review of Vitamin D levels Pre and post.
Osteoarthritis and Vitamin D

• OA affects 1.8 Million Australians
• Involves more than just cartilage
• Progressive OA many factors remain unknown

• Vitamin D needed for calcium absorption
• Is a Fat Soluable Vitamin
• More than 50nmol/L is considered normal level of Vit D.
1 in 13
1.8 million Australians with OA (reference: AIHW 2011-2012)
Osteoarthritis and Burden of Disease

• National Joint Registry has recorded over 50,000 knee arthroplasties in 2013 numbers continue to rise.

• What about the other knee? Progressive OA?

• Shea et al Arthroplasty 2013, N= 2,917 34% within 3.1 yrs.
Vitamin D is produced in the skin upon exposure to sunlight. It is then converted to 25(OH)D in the liver and further to 1,25(OH)₂D in the kidney. This form of vitamin D is involved in the regulation of cell growth, prevention of certain cancers, regulation of immune function (including diabetes type 1, MS, RA autoimmune disease prevention), regulation of blood pressure, and bone health.

Sources of vitamin D include milk, orange juice, salmon, and supplements.
Vitamin D Deficiency

**Causes**
- Sunscreen
- Melanin
- Latitude
- Winter
- Medications & Supplements
  - Antiseizure Medications
  - Glucocorticoids
  - Rifampin
  - HAART
  - St John's Wart

**Consequences**
- Schizophrenia
- Depression
- Infections
  - URI
  - TB
- IFEV1
- Asthma & Wheezing Diseases
- HBP
- CHD
- AODM
- Syndrome X
- Autoimmune Diseases
  - Type 1 Diabetes
  - MS
  - Crohn's
- RA
- CANCER
  - Breast
  - Colon
  - Prostate
  - Pancreas etc.
- Muscle weakness
- Muscle aches
- Osteoarthritis
- Osteoporosis
- Osteomalacia (Bone Pain)
- Rickets
- Malabsorption
  - Crohn's
  - Whipple's
  - Cystic Fibrosis
  - Celiac
  - Liver disease
The Effects of Rickets

- Odd-shaped Skull
- Pigeon Chest
- Wide Elbow Joints
- Wide Wrist Joints
- Bowlegs
- Odd-shaped Ribs
- Wide Knee Joints
- Wide Ankle Joints
- Spine Deformities
- Pelvic Deformities
- Short Stature (Stunted Growth)
• What Level of 25 OH D

• Deficient < 25 nmol/L
• Insufficient > 25 and < 50 nmol/L
• Suboptimal > 50 to < 75 nmol/L
• Sufficient > 75 but < 300 nmol/L
OA symptoms: Pain, stiffness, other risk Factors.

Age Female Gender, Obesity.
Risk Factors associated with OA and Vitamin D Deficiency.

- Age
- Being Female
- Genetics
- Obesity

- Mechanical Loading on abnormal cartilage
- Lack of outdoor sun exposure
- Pre - diabetes
Mechanical loading
OA under the microscope

decreased metachromasia

fissuring, pitting and flaking

exposing subchondral bone

increased vascularity and thickening of the bony trabeculae

Case 69: Osteoarthritis
Patients and Methods

Patients Total Knee Arthroplasty

N = 32

Age

M = 16
65.9

F = 16
70.25

1 Year Follow up
No one lost to FU

16/16
16/16
Excluded

• Rheumatoid Arthritis
• OA on Xray less than KL Score of 4
Gender Pre Surgery Vit D

mean 49.14
Preop Oxford scores male and female
< 20 indicates high pain levels.
1 year Post surgery

Post Oxford scores 1 yr post surgery

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<th>Scores</th>
<th>Post ox fem</th>
<th>Pos ox male</th>
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1 Year Post surgery

- 37% patients returned < 1 year for other joint surgery for OA
- At 12 month post surgery Oxford scores > 35.
- Vit D levels > 55nmol/L
Conclusions

- Small cohort
- Inconclusive but suggestive that Vit D levels < 25nmol/L show increase risk of Progressive OA
- Further studies are needed to establish dosing and routine administration of Vit D supplements when low levels are noted.
Thank you.