Obesity Related Musculoskeletal Conditions

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Speaker Introduction

• Raymond Kleposki is a pediatric orthopaedic nurse where he runs a busy pediatric fracture and acute orthopaedic injury practice. He has been a nurse practitioner for 19 years, with 17 of those being dedicated to pediatric orthopaedics. Over the years in pediatric orthopaedics, he has worked with spine, tumor, sports, neuromuscular, general orthopaedic and trauma patients. Mr. Kleposki has given more than 90 podium presentations regarding pediatric orthopaedic subjects and has been published multiple times with current ongoing research projects. He has given talks locally, regionally, nationally and internationally.

Disclosures

• I hereby certify that, to the best of my knowledge, no aspect of my current personal or professional situation might reasonably be expected to affect significantly my views on the subject on which I am presenting.

• I will not discuss off label use and/or investigational use in my presentation.

Learning Objectives

• Understand the impact of obesity on the immature skeleton.

• Identify two of the most common obesity-related conditions.

• Discuss risks that are associated with the obese child.

Obesity Related Musculoskeletal Conditions

• Overweight children participate in sports in with similar frequency to normal weight children.[1]

• Overweight children who participate in sports are at a higher risk of developing a number of orthopedic conditions compared to normal weight peers.
Epidemiology

- Childhood obesity, as reported by the CDC, affects over 18 percent of children ages 2-19.
- It is the most prevalent chronic disease of childhood in the United States.
- Obesity changes gait patterns so that it is harder for obese children to exercise without injury.
- It increases the risk for fractures, especially complex fractures.

Fractures/Injuries

- Fractures/injuries are more common in overweight and obese children.

Fractures

- Obese and morbidly obese children are at higher risk of sustaining complex fractures that require surgical correction.
- Fractures in obese children are more likely to fail non-operative treatment, than a normal weight child.
Case #1

- 10 year old male fell off ATV he was driving (no helmet)
- 154.9 cm, 92.3 kg
- BMI 40.2, >99th percentile

Case #2

- 13 year old male fell while skateboarding
- 1.5 cm open wound posteriorly
- 177.8 cm, 129.7 kg
- BMI 41, >99th percentile

Case #3

- 10 y/o male tripped over a backpack
- 155.0 cm, 101.7 kg
- BMI 42.9, >99th percentile

Case #4

- 12 year old male fell playing soccer
- 152.0 cm, 87.7 kg
- BMI 38.4, >99th percentile
- Closed reduction under anesthesia, straightforward procedure
- Required emergent reintubation after extubation in OR, developed pulmonary edema, required overnight hospital stay

Fractures

- According to a new research study published in the Journal of Bone and Joint Surgery, obese children who suffered a fracture above the elbow can be expected to experience more post-surgery complications than children with the same condition of normal weight.
**Slipped Capital Femoral Epiphysis (SCFE)**

- A hip condition that occurs in teens and pre-teens who are still growing.
- The epiphysis slips off the femoral neck through the open growth plate.
- The ice cream scoop falling off an ice cream cone.
- Displacement of the epiphysis relative to the femoral neck and shaft.
- Occurs gradually over time or immediately after a fall, accident or trauma.

**Loder Classification**

- Stable – Able to bear weight with or without crutches
  - Avascular Necrosis (<10%)
- Unstable – Unable to bear weight (not even without crutches)
  - Avascular Necrosis (47%)
  - Fracture like symptoms

**Diagnostic Images**

- AP Pelvis and Frog Lateral of the Pelvis
- The most important view is the Frog Lateral

**Physical Exam**

- Pain in hip or groin (or KNEE)
- Pain in the knee or thigh (Obturators nerve)
- Limp or unable to bear weight (Trendelenburg)
- Limp with the foot turned out (out toeing)
- External rotation of the leg, the affected leg appears shorter
- Limited internal rotation of the hip
- Leg externally rotates upon hip flexion (obligate external rotation)

**Slipped Capital Femoral Epiphysis**

- It can be diagnosed with x-rays alone.
  - It appears as if a scoop of ice cream is falling off the cone.
- It occurs in active obese children more commonly than normal weight or thin children.
  - An endocrine disorder such as hypothyroidism may be seen in normal weight and thin children or those that present before 10 years of age or after 16 years of age.

**SCFE** is the most prevalent hip problem in Adolescents.

Presents as hip/groin or KNEE pain.

It is a posterior/inferior displacement of the femoral head.

81% of all SCFE patients are obese.

A SCFE is an emergency and the child should be referred to a hospital and an orthopedic specialist as soon as possible.
Treatment

- URGENT referral to Orthopedics/ER
- Call the Orthopedist to inform them that you are sending
- NWB (non weightbearing) (wheelchair/crutches)
- Make them NPO
- Treatment of Choice- Surgery (In Situ Pinning)

Before pinning

After pinning

Treatment- SCFE Pinning

Surgery for SCFE involves a screw to hold the dislocated femoral head in place.

If severe may need to open hip and reduce the femoral head.

Both at risk for AVN of the femoral head because of the location of the slip to the blood supply

About 40% of younger SCFE patients will have a slip on the contralateral side within 18 months of the original slip.

Remember SCFE with Albert

- Early diagnosis makes a difference and recognition is key
- Adolescent
- Knee and hip pain
- Limp
- Foot turned out
- Obese
- Severe slip – poor hip function and earlier arthritis
- Unstable Slip – significantly higher avascular necrosis (AVN)

Think SCFE

- Remember the other side on follow-up visits-think bilateral disease! (25% Risk)

Obesity Related Musculoskeletal Conditions

Slipped Capital Femoral Epiphysis

SCFE

Changing incidence of slipped capital femoral epiphysis

SCFE

- SCFE is associated with long term musculoskeletal and medical problems
- 9.9% mortality (should be 1.4%)
- 4.9 times higher rate of diabetes and 2.7 times higher rate of hypertension than national average
- 71.9% obese, 48.4% very obese
**Blount Disease**

Pathologic Genu Varum

- Altered growth of the medial aspect of the proximal tibial physis. This results in progressive lower limb deformity.
- There are 2 types of Blount Disease.
  - Early presentation or Infantile
  - Late presentation or Adolescent
- Cause of Blount’s is still controversial.
  - Some genetic predisposition
  - Has mechanical and biologic forces that influence the extent of progression

**Tibia Vara (Blount Disease)**

- Growth deformity of proximal tibia that leads to progressive bowing of the legs
- More common in African Americans, males
- Almost all Blount disease patients are obese
- In one study, average adolescent Blount patient exceeded 95th percentile for weight by 43 kg [1]

**Blount Disease**

- Early presentation 2-5 years-
  - Infantile
  - 50% are Bilateral
  - Male> Female
  - More common than late onset
  - Early walkers < 1 year
  - Hispanic and African American at greater risk
  - Obesity also a common factor
  - Langenskiold Classification

**Blount Disease**

- Late onset 10 years or older- Adolescent Blount
  - More likely to be unilateral
  - Less common
  - Does not respond to bracing
  - Less severe than infantile
  - Obesity largest risk factor
  - No classification system

**Blount Disease**

- Treatment for Infantile Blount’s is first bracing.
  - Type of brace is Knee Ankle Foot Orthotics (KAFO’s)
  - Needs to be made with medial off loading
  - Early bracing looked like the Forest Gump braces.
  - Now less metal and not as imposing.
  - If bracing fails or is too severe for bracing, surgery is needed.
Blount Disease

- Surgery for Infantile or Mild Adolescent Blount is a Hemi-epiphysiodesis.
- Known as guided growth

Blount Disease

- Surgery for Severe Blount is a tibial osteotomy with an external frame.

76% of patients had increased BMI at final follow-up despite improvement in limb alignment after surgical intervention.

Obesity Related Musculoskeletal Conditions

Operative Considerations

- Pre-operative considerations
  - Hypertension
  - Obstructive sleep apnea
  - Diabetes

- Intra-operative considerations
  - Obstructive sleep apnea
  - Need for higher doses of anesthesia related to weight vs age
  - Positioning

- Post-operative considerations
  - Increase infection rate
  - Decrease wound healing
  - Increase chance of wound dehiscence
  - Hardware failure
  - Unplanned return to OR

Perioperative considerations – Medical comorbidities - OSA

Obstructive sleep apnea syndrome in morbidly obese children with tibia vara

- 11/13 (85%) had sleep apnea on polysomnography
- All required pre-operative non-invasive positive-pressure ventilation
- 5/13 (45%) required preoperative tonsillectomy and adenoidectomy

Operative Complications Due To Obesity?

- Yes, 50% complication in obese children vs. 12% in nonobese children
- Yes, Obese patients 10 times more likely than nonobese patients to develop a postoperative complication
• Less than 1% of bariatric surgeries performed in US are on adolescents (~1600/year)
• Relatively high complication rate
• Most effective treatment for obtaining and maintaining weight loss
Obesity Related Musculoskeletal Conditions

Treatment

- Needs to be addressed at every clinic visit for every discipline.
- Weight should be done at all clinic visits no matter the reason
- Diet and activity need to be discussed at every visit
- Time will be needed to change beliefs and cultural norms
  - Many cultures and races feel obesity in children is considered “healthy”
  - Need to reach out to community and church leaders to help change the mind set

Obesity Related Musculoskeletal Conditions

Conclusions

- Childhood obesity is on the rise
- Obese children are more likely to have complex fractures and conditions that require surgical correction than normal weight children
- Obesity puts these children at higher risk for injury than normal weight children and makes it harder for them to be active.
- A multidisciplinary approach is needed as well as parent/family buy in.

Thank You