The Etiology of Ankle Arthritis and the Implications of Injury, Biomechanical Abnormalities, and Proprioceptive Deficits.

RobRoy Martin PhD, PT, CSCS
Duquesne University
Department of Physical Therapy
114 Rangos School of Health Sciences
Pittsburgh, PA 15282
412-396-1811
(fax)412-396-4399
martinr280@duq.edu
A) Facts about arthritis

B) Considerations in ankle arthritis

C) Causes of ankle arthritis
   Systemic
   Primary osteoarthritis
   Post-traumatic

D) Posttraumatic
   a. Direct cartilage damage
   b. Fractures
   c. Ligamentous Injury

E) Ligamentous Posttraumatic Arthritis
   a. Cartilage damage
   b. Incongruent loading
   c. Instability
F) Other Considerations

G) Considerations for Evaluation and Treatment

H) Considerations for Surgery of Ankle Instability

I) Conclusion
References:


Examination and Conservative Medical Management of Ankle Arthritis: Information You Need to Have to Help Your Patients

Stephen F. Conti, MD
Director, Division of Foot and Ankle Surgery
Department of Orthopaedic Surgery
Allegheny Orthopaedic Associates
Allegheny General Hospital
Pittsburgh, Pennsylvania
sconti@wpahs.org

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Considerations in diagnosing ankle arthritis.

1) What other diagnoses should be considered?
2) How do you rule them in or out?

B) Over 100 types of arthritis
   1) most common types in ankle:
      i. POST-TRAUMATIC
      ii. Osteoarthritis(symmetric)
      iii. Mechanical overload(asymmetric)
      iv. Rheumatoid
      v. Other inflammatory(psoriatic, etc.)
      vi. Infectious
      vii. Neuropathic(Charcot fx’s)

C) Symptoms and signs of arthritis

D) X-ray Findings
   1) Will differ depending on disease!
2) Considerations:
   i. Asymmetric collapse
   ii. Subchondral cysts
   iii. Osteophytes
   iv. Subchondral sclerosis
   v. Symmetric collapse
   vi. Periarticular erosions
   vii. Joint subluxations
   viii. Osteopenia

E) Special Diagnostic Studies
   • Bone scan
   • CT scan
   • MRI
   • Diagnostic injections

F) Medical Management
1) Pain medicine, ie acetaminophen, for mechanical arthritis.
   i. Other OTC medications and proper recommendations
2) NSAID’s for inflammatory arthritis.
3) Physical therapy modalities
4) Appropriate and judicious use of steroid injections.
5) Vioxx-Celebrex-Bextra Controversy
6) Condroitin sulfate/ Glucosamine Issues

G) CORTICOSTEROID INJECTIONS
1) Used as an adjunct to medication and mechanical support
2) Mix anesthetic with steroid
3) Always combine with period of rest and immobilization (2-4 weeks): walking boot, cast +/- crutches
4) Best in those with effusion, swelling and warmth.

H) NONSURGICAL TREATMENT OF ARTHRITIS OF THE ANKLE
1) Always consider a stepwise, algorithmic approach to management
   i. Weight loss
   ii. Activity modification
iii. Medication
iv. Assess for ankle instability
v. Correct mechanical alignment
vi. Maintain ROM
vii. Modalities?
viii. Physical Therapy?

I) Mechanical Support
1) Shoes-Full length rocker soles with SACH heels
2) Braces-Fixed ankle AFO
   Double upright brace with calf lacer
   PTB brace
3) Cast immobilization

J) Mechanical Support: General principles
1) Precisely determine affected joint(s).
2) Decide if need just immobilization or must control weight-bearing forces and instability.
3) Determine level of control needed, ie orthosis, UCBL, Arizona brace, posterior AFO, double upright AFO with calf lacer or PTB, casting.

4) Always combine with appropriate shoe.

K) Adjuncts to mechanical support
   1) Flooring
   2) Exercise recommendations

L) Orthotics & Prosthetics
   1) Custom molded removable cast
   2) Pressure relieving custom insert
   3) Rocker bottom sole
   4) SACH heel
   5) Double Upright Ankle-Foot Orthosis with Calf Lacer
      i. Weight transferred through brace to ground?
      ii. Can be permanent orthosis
      iii. Accomodative shoes & leather calf gauntlet allow for swelling
iv. Ankle joint allows ability to lock or limit ankle ROM

6) **PTB Orthosis (Patellar Tendon Bearing)**
   i. Unloading of foot & ankle up to 40%
   ii. Greater unloading due to design, i.e. patella bar & popliteal purchase
   iii. Adjustable length allows distraction
   iv. Full plastic design of PTB socket attached to double upright AFO
   v. Intimate fit does not allow volume changes

7) **Range Of Motion Walking Boot**
   i. Ability to limit ankle motion
   ii. Rocker bottom sole
   iii. Pressure relieving plantar surface
iv. F-scan data supports unweighting

8) Accomodative footwear
   i. Shoe with custom foot orthosis
   ii. Construction & modification of insert to decrease pressure
   iii. Shoe modifications
       1. Medial / Lateral sole flares

Role of PT in managing ankle arthritis

   a. Most effective in maintaining mobility of whole person with suggestions on accommodating to ankle pain, ie low impact activity, workplace modifications
   b. Proper use of shoe modifications
   c. Maintain ROM
   d. Modalities?
An Update on the Surgical and Post-Surgical Management of Ankle Arthritis

Stephen F. Conti, MD
Director, Division of Foot and Ankle Surgery
Department of Orthopaedic Surgery
Allegheny Orthopaedic Associates
Allegheny General Hospital
Pittsburgh, Pennsylvania
sconti@wpahs.org
A) ARTHROSCOPIC DEBRIDEMENT
   a. Useful to assess cartilage and, maybe, to give temporary relief
   b. Debridement of scar and adhesions seems beneficial in many cases
   c. Considerations for the PT include aggressively re-establishing active and passive ROM and strength and proprioception. Reduction is swelling is very important. Continuing PT until pain resolution is not important.

B) Resurfacing

C) Joint Distraction
   a. Indications
   b. Results

D) Osteotomy

E) Arthrodesis vs. Arthroplasty: Why is there so much controversy?
   a. Unlike shoulder, hip and knee fusion, ankle fusion is not a terrible operation.
   b. First generation ankle replacements
had disappointing results.

c. Many lumpers can’t handle the controversy.

F) Arthrodesis

a. Ankle fusion is initially successful 83% of the time (1 in 6 nonunion).

b. Ankle fusion results in complete loss of ankle motion (80% of tibiopedal motion) with a short limb.

c. 15% of patients undergoing ankle fusion have symptomatic subtalar arthritis that is unrecognized by the treating surgeon.

i. Ankle fusion will result in midfoot arthritis in most patients after 15-20 years.

d. Ankle fusion has 20% unsatisfactory clinical results.

e. Postoperative protocols after ankle fusion include NWB x 3 months followed by PT. Therapy should include hindfoot mobilization and ROM, strength and proprioception. Almost all patients have an
antalgic gait and shoe modifications, not simple orthoses, smooth out their gait. Fast walking is the usual maximum activity level after ankle fusion.

G) History of Implants
   a. Constrained (single axis)
   b. Semi Constrained
   c. Non Constrained (multi axial)

H) Possible reasons for failure
   a. Design
   b. Patient selection

I) Agility Total Ankle
   a. Benefit of its design
   b. Evolution of the Agility Implant

J) Ankle Replacement
   a. What is known and unknown
   b. Ankle replacement is currently the treatment of choice, in my practice, in patients with other joint limitations (knee, previous triple arthrodesis).
   c. It is offered to patients with disabling ankle arthritis but well preserved motion.
d. Currently: 60% fusion, 40% replacement

K) My Personal/Professional Experience
   a. Steepest learning curve of any surgery I have ever done
      Intraoperative complications:
      - malleolar fractures
      - superficial neuropraxias
      - malpositioning of components
      Postoperative complications:
      - wound healing difficulties
      - loss of motion
      - distal tib-fib nonunion
      - periprosthetic lucencies
   
   b. Considerations:
      i. Soft Tissue Balance
      ii. Bone Stock

L) Post-Surgical Rehab
   a. Guidelines
   b. Expectations
M) Current State of the Art?
   a. Long-term ankle instability leads to arthritis
   b. All end-stage ankle arthritis patients should be told about ankle fusion and replacement
      
      www.allaboutarthritis.com
      www.agilityankle.com
   c. No ankle surgery on pts less than 60 will be their last surgery
   d. If performing fusion on someone under age 60 consider choosing a surgical procedure which will allow for possible conversion to TAR in the future (preserving the malleoli)
   e. If considering TAA find a surgeon with formal training in ankle replacement and a lot of experience
   f. TAA is not going to go away. The next refinement is not deciding which prosthesis is better but which patients will benefit from fusion and which from replacement and determining the best course of postoperative therapy
M. Conclusion

a. Surgical decision-making takes into account age, activity level, status of other joints, preoperative ROM, x-ray appearance of ankle and expectations of patient.

b. Most patients with ankle arthritis will see a therapist early in their course following the initial trauma. Important to discuss expectations with patient.

c. All patients should at least hear about both fusion and replacement and understand why they may be a better candidate for one of the surgeries.

d. PT following ankle surgery must establish ankle ROM (especially DF), strength, and proprioception but must be tempered by realistic expectations by both the patient and therapist.
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1 Ryker NJ Jr, Glass walkway studies of normal subjects during normal walking. Univ Calif Prosthet Device Res Rep, Ser 11, ISSUE 20, Jan 1952
PHYSICAL THERAPY INTERVENTION
FOR INDIVIDUALS WITH ANKLE ARTHRITIS

Stephen Reischl, DPT, OCS
Reischl Physical Therapy, Long Beach, Ca
Department of Biokinesiology and Physical Therapy
University of Southern California
reischl@usc.edu

DESCRIPTION: This presentation will review the relevant anatomy and biomechanics of the ankle in relationship to the development of ankle arthritis. Forces acting on the ankle during human movement create enormous stress upon this joint in daily activity. When pathology is present, the patient and health care professionals will need to determine the course of treatment whether it be conservative or operative treatment. This presentation will review a treatment plan to assist in non-operative care and in rehabilitation following surgery.

OBJECTIVES: At the end of this presentation the audience will:

• Understand the forces upon the ankle joint during normal activity and in patients with ankle arthritis

• Using the Nagi Disablement Model, link the pathology to impairment findings that cause the functional limitations which in turn contribute to the disability of the patient in society.

• Understand the components of a physical therapy assessment in patients with ankle arthritis.

• Develop a treatment program for patients with ankle arthritis with components of manual therapy, home exercise program, bracing, foot orthoses and other shoe modifications.

THE PATHOLOGY:
Loss of hyaline cartilage

Osteophyte formation

Changes in normal joint position
Frontal plane deformity: Varus Valgus deformity
Sagittal plane deformity: Equinus deformity (less likely calcaneus deformity
Transverse plane deformity: IR and ER deformity

Effect on ankle joint from proximal or distal deformity.
Tibia-fibula change from fracture or other deformity
Foot deformity

Ligamentous instability

DISABILITY AND FUNCTIONAL LIMITATIONS

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Normal and Abnormal Function of the Ankle Joint

Walking and other activities of daily living

Kinematics

Kinetics

Muscle Activity

High compressive loads during normal walking
   Articular load
   Muscle compressive forces
   Moving into closed pack position

Compressive forces during normal activities
   Stair Ascend
   Stair Descend
   Squatting

How can we measure patients reported loss of function?

Self Reported Outcome Forms:
   FAAM
   FFI

Functional Testing
   6 minute walk
   Timed Get Up and Go
   Chair Stands

**IMPAIRED FINDINGS**

Neurological and Vascular screening

Functional observation

Range of motion/ flexibility restrictions

Strength and Endurance of Lower Extremity

Accessory motion testing of foot and ankle
GOALS, PROGNOSIS, TREATMENT PLAN

Is the patient appropriate for physical therapy?

Make certain there is a clear understanding of goals, prognosis and expected outcomes.

Patient Participation

PHYSICAL THERAPY INTERVENTION

MOVEMENT REEDUCATION

MANUAL THERAPY INTERVENTION

HOME PROGRAM

MODIFICATION OF FOOTWEAR

ASSISTIVE DEVICES

BRACING SUGGESTIONS

References:


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