The Complex Foot and Ankle

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DISCLAIMER

The information being presented is a supplement for use with the CPT-4® and ICD-10 coding manuals. The intent of this presentation is to be used as a tool to assist in understanding the complexities of foot and ankle coding. There is no guarantee that the information presented will prevent difference of opinion with providers or carriers and should not be used in reimbursement disputes. Always consult CPT®, CMS and your payers for specific guidance and policies.
AGENDA

• Foot and ankle anatomy overview
  • Boney anatomy
  • Ligamentous anatomy
  • Primary tendons
    • Function, Origin, Insertion

• Terminology

• Common Foot Procedures
ANATOMY OVERVIEW

The key to coding any foot and ankle condition, injury or procedure is a strong understanding of anatomy and terminology.
ANKLE JOINT

• Talocural joint
  • Composed of articulations between 3 bones
    • Tibia (largest, medial), Fibula (smaller, lateral), Talus (Foot bone)
  • Weight distribution transmitted from the tibia to the talus
    • Fibula is a non-weight bearing bone but provides muscle and ligament attachment
    • Ankle must hold 1.5 x our body weight when walking and 8x our weight when running
• Hinge joint
• Motion
  • Flexion, extension (Ankle alone)
    • Greater than 100°
  • Joint capsule thin anteriorally and posteriorally
    • Supported medially and laterally by ligaments
• Synovial joint
FOOT JOINTS

• Subtalar joint
  • Articulation of talus and calcaneus (talocalcaneal joint)
  • Fibrous layer joint capsule attached to margins of articular surfaces
  • Permits inversion and eversion
  • Synovial joint

• Talocalcaneonavicular joint
  • Articulation of talus, calcaneus and navicula
  • Ball and socket variant
  • Supported by the spring ligament
  • Joint capsule incompletely encloses joint
  • Gliding and rotational movements of the foot
  • Part of the transverse tarsal joint
  • Synovial joint
FOOT JOINTS

• Calcaneocuboid
  • Articulation of anterior calcaneus w/posterior cuboid
  • Enclosed by fibrous capsule
  • Permits inversion and eversion, circumduction
  • Synovial joint

• Cuneonavicular joint
  • Articulation of anterior navicular w/bases of cuneiforms
  • Common capsule encloses joints
  • Little movement
  • Synovial joint
FOOT JOINTS

• Transverse tarsal joints
  • Joints between talus and navicula medially and calcaneus and navicula laterally
  • Synovial joints
  • Act as a unit to provide inversion and eversion
  • Midtarsal joint
FOOT JOINTS

• Tarsal-metatarsal joints
  • Articular capsules with plantar, dorsal and interosseous ligaments
  • Motion gliding and sliding
  • Synovial joint

• Metatarsophalangeal joints
  • Multiaxial condyloid joints
  • Surrounded by articular capsule, strengthened by plantar (plantar plate) and collateral ligaments
  • Motion flexion & extension, some abduction, adduction, circumduction
  • Synovial joint

• Interphalangeal joints
  • Uniaxial hinge joints
  • Enclosed by capsules, strengthened by plantar & collateral ligaments
  • Motion flexion & extension
  • Synovial joint
SKELETAL ANATOMY

Tarsals
TALUS

- Majority of ankle surface covered with articular cartilage
- Multiple ligamentous attachments
- No muscle attachments
- Passive function
- With calcaneus creates the hindfoot
- Tarsal
  - Head-articulates with navicula
  - Neck
  - Trochlea/dome-articulates with tibia to form ankle
- Lateral and posterior process
CALCANEUS

• Also called os calcis; heel bone
• Largest and strongest bone in the foot
• Lever arm for insertion of Achilles tendon-tuberosity
• Articulates with talus and cuboid
• Part of lateral column
• With talus creates the hindfoot
• Tarsal
TARSAL NAVICULAR

• Lies anterior to talus, medial to cuboid
• Keystone for longitudinal arch
• Articulates with talus, cuneiforms and cuboid
• Posterior tibialis tendon inserts medial tuberosity
• 4-10% of population has accessory navicular (os tibiale); lies within the posterior tibialis
  • ICD-9 dx accessory navicular 732.5 not 755.67
• Tarsal
**Cuboid**

- Articulates with calcaneus proximally and 4\(^{th}\) and 5\(^{th}\) metatarsals distally
- Slight articulation with navicular medially
- Groove for peroneus longus
- Tarsal
Cuneiforms

- Wedge shaped
- Articulates w/first three metatarsals distally and navicular proximally
- Three bones-Medial, Intermediate/Middle, Lateral
- Lateral cuneiform articulates w/cuboid
- Tarsal
BONES OF THE FOOT (FROM ABOVE)
SKELETAL ANATOMY

Metatarsals, Phalanges
Metatarsals and Phalanges

Metatarsals
• Consist of a base, shaft and head
• Base articulates with cuneiforms and cuboid
• Head articulates with base of proximal phalanx

Phalanx
• Base most proximal aspect
• Great toe distal and proximal only (like thumb)
**Accessory Bones**

- Foot & ankle have approximately 40 accessory ossicles & multiple sesamoids
  - Os=bone
  - Accessory ossicles or “os” are 2ndry ossification centers that stay open & separated from the normal bone
    - Most common
      - Os trigonum- posterior talus
      - Os tibialis externum-navicula
      - Os subfibulare-inferior fibula
        - Can be associated with chronic ankle instability & recurrent sprains
        - Can be avulsion of ATFL w/2ndry ossification
Os Trigonum
ACCESSORY BONES

• Sesamoids bones that are incorporated into tendons & move with normal & abnormal tendon motion
  ▪ Most common
    o Os peroneum-in peroneus longus cuboid near base of 5th MT
      • May represent avulsion or rupture of peroneus longus
    o (Hallux) sesamoids-in flexor hallicus brevis tendon base of 1st MTH; 2
      • Commonly referred to based upon position
      • Medial & lateral or Tibial & fibular
LIGAMENTS

Foot and Ankle Anatomy
ANKLE LIGAMENTS

Two groups: lateral collateral & medial collateral

- Lateral
  - Anterior talofibular (ATFL)
  - Calcaneofibular (CFL)
  - Talocalcaneal
  - Posterior talocalcaneal
  - Posterior talofibular

- Weak
  - Resists inversion, ligaments generally tear with inversion injuries
  - Tear from anterior to posterior → ATFL usually torn first
ANKLE LIGAMENTS

• Lateral
  ▪ Anterior talofibular (ATFL)
    o Tip of lateral malleolus to talus anteriorly
    o Limits plantarflexion
  ▪ Calcaneofibular (CFL)
    o Lateral malleolus to calcaneus
  ▪ Talocalcaneal
    o Runs along base of calcaneofibular
    o w/calcaneofibular resists adduction
  ▪ Posterior talocalcaneal
    o Tip lateral malleolus to talus posteriorally
  ▪ Posterior talofibular
    o Continues talocalcaneal to the calcaneus
    o Both limit dorsiflexion
ANKLE LIGAMENTS

• Medial i.e. Deltoid
  ▪ Tibionavicular
  ▪ Calcaneotibial
  ▪ Anterior talotibial
  ▪ Posterior talotibial

• Limits eversion of the foot
• Helps maintain medial long arch of the foot
ANKLE LIGAMENTS

• Medial i.e. Deltoid
  ▪ Tibionavicular
    o Anteriorly from medial malleolus to navicular
  ▪ Calcaneotibial
    o Tip of medial malleolus to calcaneus
    o w/tibionavicular prevents abduction
  ▪ Anterior and posterior talotibial
    o Medial malleolus and talus
    o Limit plantar flexion (anterior) and dorsiflexion (posterior)
STRUCTURAL ANATOMY

Foot and Ankle Anatomy
STRUCTURAL ANATOMY

• Divisions
  ▪ Forefoot
    o phalanges and metatarsals
  ▪ Midfoot
    o 5 of the 7 tarsals
    o navicula, cuneiforms, cuboid
    o division is tarsometatarsal joint
  ▪ Hindfoot
    o Talus, calcaneus
STRUCTURAL ANATOMY FOOT COLUMNS

• Medial
  ▪ Navicula, cuneiforms, metatarsal and phalanges 1-3
  ▪ Articulates with hindfoot at talonavicular joint

• Lateral
  ▪ Calcaneus, cuboid, metatarsal and phalanges 4-5
**Structural Anatomy**

- **Arches**
  - **Longitudinal**
    - More developed medially than laterally
    - Apex = talus
    - Posterior pillar = calcaneus
    - Anterior pillar = tarsals and MT
    - Thus the long arch from heel to toes
  - **Transverse**
    - MT, cuboid, cuneiforms
    - Transmits weight distribution

- **Kinematics**
  - Shock absorption
  - Accommodation to surface irregularities
  - Push off
MUSCLE AND TENDON ANATOMY

Foot and Ankle Anatomy
TIBIALIS ANTERIOR

• Origin: Lateral condyle & lateral shaft of tibia interosseus membrane
• Insertion: Base of 1st MT, plantar surface medial cuneiform
• Action: Dorsiflexion ankle, inversion foot @ subtalar & midtarsal joints **FLEXOR**
• Innervation: Deep peroneal nerve
• Largest muscle in anterior compartment
• Blood supply from anterior tibial artery and branches
• Paralysis results in foot drop
• “shin splints” involve this muscle
TIBIALIS POSTERIOR

• Origin: interosseus membrane, posteriormedial surface fibula, posterior lateral surface tibia
• Insertion: tuberosity of navicula, medial cuneiform, metatarsal 2-4
• Action: Plantar flexes and inverts the foot
• Innervation: Tibial nerve
• Blood supply from fibular and tibial artery and branches
• Acts as both antagonist (dorsiflexion/plantarflexion) and synergist (inversion) of tibialis anterior muscle
EXTENSOR HALLICUS LONGUS

• Origin: Middle portion anterior surface of fibula and interosseus membrane
• Insertion: Dorsal aspect base distal phalanx great toe
• Action: Extends great toe, assists dorsiflexion of foot @ ankle, weak invertor
• Innervation: Deep peroneal nerve
**Extensor Digitorium Longus**

- **Origin:** Lateral condyle tibia, proximal 2/3 anterior shaft fibula & interosseus membrane
- **Insertion:** Middle & distal phalanges toes 2-5
- **Action:** Extension lateral 4 toes @ MP joint; assist dorsiflexion of foot @ ankle
- **Innervation:** Deep peroneal nerve
PERONEUS LONGUS

• Origin: Head and upper 2/3 lateral surface of fibula
• Insertion: ends in a long tendon that runs behind lateral malleolus & crosses obliquely on plantar surface of foot inserts on base of 1st MT & medial cuneiform
• Action: Eversion of foot; weak plantarflexor of foot @ ankle
• Innervation: Superficial peroneal nerve
• Peroneus=Greek for fibula
PERONEUS BREVIS

- Origin: Distal 2/3 of lateral shaft fibula
- Insertion: Ends as tendon passes behind lateral malleolus, inserts on tuberosity of base 5th MT
- Action: Eversion of foot; assist w/ plantarflexion of foot @ ankle
- Innervation: Superficial peroneal nerve
GASTROCNEMIUS

- Origin: 2 heads; lateral head arises from lateral epicondyle; medial head from medial epicondyle of femur
- Insertion: Unites with the soleus to form the Achilles tendon, attaches to calcaneus
- Action: Plantarflexion foot @ ankle, flexes leg @ knee, raises heel during walking
- Innervation: Tibial nerve
- Gastro=Greek for “belly”
- Can act on knee or ankle separately but not simultaneously
- Muscle cut when performs Strayer/gastroc resection
SOLEUS

• Origin: Posterior aspect head of fibula, proximal 1/3 body of fibula, medial border of tibia
• Insertion: Forms aponeurosis that joins gastroc to form *Achilles*, attaching to calcaneus
• Action: Plantarflexion foot @ ankle
• Innervation: Tibial nerve
• Important postural muscle, aids in maintaining balance
• Constantly active even during quiet standing
• Soleus=Latin for sole, a flat fish
• Gastroc + Soleus=Triceps surae
MUSCLE AND TENDON ANATOMY FOOT

Foot and Ankle Anatomy
**Flexor Hallicus Brevis Muscle**

- **Origin:** plantar surface cuboid & lateral cuneiform
- **Insertion:** distal divides into two parts
  - medial blends with abductor hallicus inserts medial aspect base proximal phalanx
  - Lateral blends with adductor hallicus inserts on lateral side base proximal phalanx
- **Action:** Flexes proximal phalanx big toe @MTP joint
- **Innervation:** Medial plantar nerve
- **Tendons of insertion are associated with the sesamoids**
- **Hallicus = great toe**
- **Brevis = short**
**Abductor Hallucis Muscle**

- **Origin:** medial process calcaneal tuberosity, flexor retinaculum & plantar aponeurosis
- **Insertion:** medial aspect base proximal phalanx big toe
- **Action:** Abducts big toe at MTP joint, flexes toe
- **Innervation:** Medial plantar nerve
- **Inserts w/medial tendon of flexor hallucis brevis**
**ADDUCTOR HALLICUS MUSCLE**

- **Origin:** oblique head base of 2nd to 4th MT and long plantar ligament
  - Transverse head plantar metatarsophalangeal ligaments 3rd, 4th 5th toes
- **Insertion:** 2 heads converge blends with flexor hallucis brevis inserts on lateral side base of proximal phalanx big toe
- **Action:** adducts big toe flexes proximal phalanx @ MTP joint; helps maintain transverse MT arch; **FLEXOR**
- **Innervation:** Deep branch lateral plantar nerve
**Flexor Digitorium Brevis**

- **Origin:** medial tubercle calcaneal tuberosity, plantar aponeurosis & intermuscular septa (muscle)
- **Insertion:** gives rise to 4 tendons that are superficial to tendons of flexor digitorium longus; insert on both sides of 2-4 phalanges
- **Action:** flexes middle phalanx toes 2-4
- **Innervation:** Medial plantar nerve
- **Similar to:** the superficial and deep tendons of the hand
**FLEXOR DIGITORIUM LONGUS**

- Origin: posterior surface of tibia (muscle)
- Insertion: gives rise to 4 tendons insert base distal phalanx 2-4
- Action: flexes distal phalanx toes 2-4
- Innervation: Tibial nerve
- Similar to the superficial and deep tendons of the hand
LUMBRICALS

• Origin: flexor digitorium longus tendon
• Insertion: medial side base proximal phalanges 2-5
• Action: assist in joint movement between metatarsals, flexes MTP, extends IP
• Innervation: medial & lateral plantar nerve
MAJOR NERVES

Foot and Ankle Anatomy
MAJOR NERVES

• Femoral nerve and it’s branch, the saphenous supply muscles at front of thigh, joints of hip & knee & skin of thigh, leg & foot
• Sciatic & branches (tibial and common peroneal) supply Hamstrings of thigh and all muscles of leg & foot
  • Common Peroneal branches-Lateral Sural Cutaneous, Deep Peroneal, Superficial Peroneal
MORE NERVES

• Sensory (cutaneous) nerves:
  • Lateral Dorsal Cutaneous (sural in foot)
  • Saphenous
  • Medial Calcaneal
COMMON SURGICAL PROCEDURES

Foot and Ankle Anatomy
TERMINOLOGY

• Hallux = great toe
• Metatarsus = metatarsal
• Primus = first
• Varus/valgus = position related to the midline
  • Varus-away from the toes
  • Valgus-toward the toes
• Pes = foot
• Talipes = congenital deformity of the foot noted to be twisted at heel, ankle & toes
  • Tali=talus; pes=foot
  • Often synonymous with clubfoot
• Cavus = high arch
• Equinus = restricted dorsiflexion of foot @ ankle
TERMINOLOGY

- Osteo-bone
- Arthro-joint
- Chondral-cartilage
- -ectomy-excision
- -otomy-cutting to redirect position
- -rrhaphy- surgical suturing
- -desis-tighten; fuse
Bunions
BUNIONS THE PROCEDURES 2016

• 28290- removing the boney bump
  • Silver

• 28292-removing the bump and doing a distal soft tissue release; may include excision of the base of the distal phalanx or resection of metatarsal head (rare)
  • Keller, McBride, Modified McBride, Mayo

• 28293- insertion of implant

• 28294-tendon transfer

• 28296-correction by metatarsal osteotomy
  • For correction of HV and only for 1st MT
  • Austin, Chevron, Scarf, BOAT, Reverdin, Ludloff, Mitchell, Youngswick, Hohmann, LaGreshino, Kalish, reverse Austin……..

• 28298-correction by phalangeal osteotomy not 28310
  • Done to correct hallux interphalangeus
  • Akin, Moberg
BUNIONS

• 28299-double osteotomy
  • Chevron-Akin; double osteotomy
  • Includes phalanx and DISTAL metatarsal or double metatarsal
  • Any combination of hallux valgus procedures (28290-28298; 28485)
  • If phalanx and **proximal** MT 28298 and 28306 per CPT Assistant
    • March 2016 FAQ states 28299
  • AAOS and NCCI says includes all osteotomies of 1\textsuperscript{st} MT & 1\textsuperscript{st} proximal phalanx
Bunions

• 28297-Lapidus fusion of the proximal 1\textsuperscript{st} TMT joint (base of 1\textsuperscript{st} MT and medial cuneiform) AND distal soft tissue release
  • AAOS allows additional reporting for phalangeal osteotomy (28310)
    • 28740 with 28298
    • Harvesting bone graft separate site separately reportable

• If diagnosis is hallux valgus, this series of codes are to be used.
PREOPERATIVE DIAGNOSIS:
Midfoot deformity, left foot.
Painful bunion with hallux valgus, left foot.

POSTOPERATIVE DIAGNOSIS:
Midfoot deformity, left foot.
Painful bunion with hallux valgus, left foot.
Intermetatarsal and tarsometatarsal joint subluxation.

PROCEDURES PERFORMED:
- Midfoot fusion, left foot.
- Bunionectomy with Akin osteotomy, left foot.
- Open repair of tarsometatarsal dislocation, left foot.

SURGEON:
ANESTHESIA: See anesthesia record.
ESTIMATED BLOOD LOSS: Minimal.

INDICATIONS: This is a patient who suffers from chronic unrelenting bunion pain associated with severe midfoot deformity, as well as first ray deformity. She elects surgical management.

INTRAOPERATIVE FINDINGS: Classic lateral deviation of the hallux, classic medial deviation of the first metatarsal with exostosis on the medial aspect of the first metatarsal head, classic apex of the deformity at the first tarsometatarsal joint, and significant intermetatarsal and tarsometatarsal subluxation noted as well.

PROCEDURE DETAIL: The patient was first identified outside the operating room. Consent was reviewed. The operative site was marked. The patient was brought into the operating room and placed on the operating room in the supine position. Anesthesia was administered and augmented with 20 mL of 1% Xylocaine plain in an ankle block fashion. The foot and leg were prepped and draped in the appropriate sterile manner. The left foot was elevated and exsanguinated. A left ankle pneumatic tourniquet was inflated at 250 mmHg. Attention was directed to the skin overlying the first tarsometatarsal joint and extending up onto the great toe where a long dorsal linear incision was performed with careful dissection carried through the subcutaneous tissue down to the extensor tendon, making sure to avoid all pertinent neurovascular structure, clamp and ligate, and Bovie all bleeder. An incision was then made in the first metatarsophalangeal joint capsule. The capsule and periosteum were sharply dissected from the dorsal and medial aspect of the first metatarsal exposing an exostosis, which was resected via power instrumentation. Attention was directed to the first intermetatarsal space where a fibular sesamoid release was performed in the usual fashion. Dissection was then carried carefully back to the level of the first tarsometatarsal joint where that joint was opened up. The cartilaginous surfaces were visualized, and the cartilaginous surfaces were resected in a
plane fashion, getting down through the cartilage and subchondral bone down to good healthy tissue for fusion. More bone was taken laterally from the medial cuneiform to close the intermetatarsal angle, and the valgus rotation of the first metatarsal was also noted and corrected when manipulating the bone for fusion. Once knowing that appropriate intermetatarsal angle was achieved, as well as appropriate rotation of the first metatarsal, I prepared the joint in the usual fashion, making sure to break through with a 2-mm drill bit and get a nice amalgam for fusion, and then I went ahead and rotated that first metatarsal out of its valgus position, temporarily fixated with K-wires to make sure the position was appropriate, and then rigidly fixated the fusion site with a solid 3.5-mm Arthrex cortical screw using AO technique and then a 4-mm cannulated screw as well from proximal to distal. I then checked for intercuneiform and jansmetatarsal joint instability, and it was present, so to stabilize the transverse plane of the correction, I also placed a 4-mm x 40-mm cannulated screw from the base of the first metatarsal into the intermediate cuneiform. Once this was done, we got an even better closure of the intermetatarsal angle and a very rigid medial column repair. The wound was lavaged with copious amounts of sterile saline x 3, and I remodeled some of the prominent bone at the medial cuneiform to make sure there was no painful prominence or irritation in this area. I had the first metatarsal nice and parallel to the second metatarsal but I noted she still had a fair amount of abductus present at the hallux so I extended the incision to expose the proximal one-third of the proximal phalanx of the hallux, performed an Akin osteotomy at this site, and took a small medially based wedge of bone to get the toe into a nice position so she would have a real functional great toe joint and proper positioning of the first ray. This osteotomy was rigidly fixed at with a 2.5-mm x 22-mm Arthrex headless compression screw. The wound was lavaged with copious amounts of sterile saline x 3. Range of motion was noted in the proper plane. All the screws were noted to be quite tight, and good rigid fixation was achieved. The wound was lavaged with copious amounts of sterile saline. We used C-arm throughout the case to make sure we checked position of all fixation and fusion sites and repair. Capsule and periosteum were then reapproximated with absorbable suture, the subcutaneous tissue with absorbable suture, and the skin with nonabsorbable suture. Additional 10 mL of 0.5% Marcaine plain was injected locally for long-lasting anesthesia. Xeroform gauze and a dry sterile bulky dressing was applied to the foot, as well as a mildly compressed Ace wrap and posterior splint. The tourniquet was deflated, and immediate capillary refilling time was noted in the digits of the left foot. The patient tolerated the procedure and anesthesia well.
Bunions

• Adductor transfer
  ▪ If no other bunion procedure being done and dx of HV 28294
    o CPT Assistant 11.96 “If tendon transplant is a major part of the procedure this code should be used.”
  ▪ If MT osteotomy or Lapidus and adductor transfer 27690 transfer or transplant of single tendon (with muscle redirection or rerouting); superficial (eg. anterior tibial extensors into midfoot)
  ▪ Adductor hallucis plantar tendon complex inserts lateral base proximal phalanx
  ▪ Separate incision
PROCEDURE
The patient was identified in the preoperative holding area. The surgical site was marked. The extremity was initialed, H&P was reviewed, and consent was confirmed. She was transported to the OR and placed supine on the OR table. IV antibiotics were administered. General anesthesia was administered. Airway was placed without incident. A well-padded ankle tourniquet was applied. The right foot and ankle were prepped and draped steriley. A timeout was then performed to identify the proper patient, surgical site, and procedures to be performed. An Esmarch was utilized to exsanguinate the right foot and the ankle tourniquet was inflated. A 1st ray block was completed in a Mayo block fashion with 0.5% Marcaine plain utilizing 30 cc for regional anesthesia. Once this was obtained, a dorsal medial incision was made about the 1st MTP. This was done approximately 6 cm in length. This was dissected down in layers with neurovascular identification and retraction. A dorsal approach lateral release was conducted. The distal lateral margin of the joint was isolated and the adductor hallucis was removed from its distal insertion. The fibular sesamoid and capsule were freed up, and the adductor hallucis was transferred to the distal lateral aspect of the 1st metatarsal with 2-0 Vicryl. Following this, there was still deformity that remained. This was taken with osteotomy. A dorsal medial incision was made about the 1st MTPJ exposing the eminence. The 1st metatarsal was removed with a sagittal saw for a flat surface then with an axis guide, a long arm chevron osteotomy was conducted. This was transposed lateralward approximately 2.5 mm. This was temporarily fixated and then permanently fixated with a 2.7 x 20-mm Bio-Compression screw placed from dorsal distal and plantar proximal perpendicular to the long arm of the osteotomy. This improved the condition. I realigned the sesamoids and with a capsulorrhaphy, improved the hallux valgus condition. Medial eminence remaining was removed as well as dorsal and medial overhang of bone. This was remodeled with the sagittal saw and rotary bur. The site was irrigated and then a biased capsular closure was completed with 2-0 Vicryl and 3-0 nylon on the skin for maintenance of correction. This was confirmed with intraoperative fluoroscopic assistance. Stable and residual fixation was appreciated of the osteotomy via the absorbable screw fixation prior to closure. Sterile compressive dressing was applied after a layered closure was conducted. Vascular status was found to be intact after deflation of the tourniquet.
BUNIONS

• All include removing of the bony prominence, capsulotomy, arthrotomy, synovial biopsy, synovectomy, tendon release, tenotomy, tenolysis, excision of medial eminence, excision of associated osteophytes, placement of internal fixation, scar revision, articular shaving, and removal of bursal tissue when done at the first MTP joint (AMA CPT Assistant)
BUNIONS

- Metatarsal head moved over
- Cut in bone

Chevron Guide
Hallux Limitus/Rigidus

- Cheilectomy-28289, excision of osteophytes of the proximal phalanx and distal metatarsal is done for hallux rigidus, hallux limitus
  - Includes capsular release and removal of any additional prominences
- Although not part of the bunion procedures, procedures to also correct bunion deformities are bundled into the cheilectomy
- Fusion-28750 arthrodesis great toe MTP joint
BUNIONS THE PROCEDURES 2017

Deleted codes

• 28290 (Silver); instructional note to use 28292
• 28293 (insertion of implant); instructional note to use 28291
• 28294 (tendon transfer); instructional note to use 28899

New codes

• 28295 Correction, hallux valgus (bunionectomy), with sesamoidectomy, when performed; with proximal metatarsal osteotomy, any method
  – Same work RVU as 28296 decreasing (8.35 → 8.25)
• 28291-Hallux rigidus correction with cheilectomy, debridement and capsular release of the first metatarsophalangeal joint; with implant
  – Work RVU 28289 decreasing (8.31 → 6.90)
    28291 → 7.81
BUNIONS THE PROCEDURES 2017

Revised codes

• 28289 revised code description adding without implant

• 28292 revised code description
  • Correction, hallux valgus (bunion), with or without sesamoidectomy when performed; Keller, McBride, or Mayo type procedure with resection of proximal phalanx base, when performed, any method
BUNIONS THE PROCEDURES 2017

Revised codes

• 28296 revised code description
  • Correction, hallux valgus (bunion), with or without sesamoidectomy when performed; with distal metatarsal osteotomy (e.g., Mitchell, Chevron, or concentric type procedures)

• 28297 revised code description
  • Correction, hallux valgus (bunion), with or without sesamoidectomy when performed; with Lapidus type procedure with first metatarsal and medial cuneiform joint arthrodesis, any method

• 28298 revised code description
  • Correction, hallux valgus (bunion), with or without sesamoidectomy when performed; by with proximal phalanx osteotomy, any method

• 28299 revised code description
  • Correction, hallux valgus (bunion), with or without sesamoidectomy when performed; by with double osteotomy, any method
BUNIONS DIAGNOSIS

• Bunion i.e. the bump
  • ICD-9 was also the code for bunionette or Tailor’s bunion or baby bunion-boney prominence of the 5th not 1st
  • ICD-10-CM bunion referred to hallux valgus M20.1-
    • 2017 separate dx. M21.61-
BUNIONS DIAGNOSIS

• Bunionette
  • ICD-9 was also the code for bunionette or Tailor’s bunion or baby bunion-boney prominence of the 5th not 1st
  • Bunionette currently does not exist in ICD-10 M20.5X- w/laterality
    – October 2016 M21.62-
BUNIONS DIAGNOSIS

• Hallux valgus-inward turning of the great toe (acquired)   ICD-10 M20.1_ w/laterality

• Hallux varus-outward turning of the great toe (acquired)
  • ICD-10 M20.3- w/laterality

• Hallux interphalangeus- rotational deformity of the great toe at the IP joint
  • ICD-10 M20.5- w/laterality  Other deformities of toe(s), acquired

• Metatarsus primus varus-movement of the 1st metatarsal away from the midline
  • M21.6X- Other acquired deformities of foot
BUNIONS DIAGNOSIS

• Hallux limitus—limitation of motion of the 1\textsuperscript{st} MTP joint
  • ICD-10 M20.5X- w/laterality (other deformity of toe(s) acquired)

• Hallux rigidus—complete limitation of motion of the 1\textsuperscript{st} MTP joint
  • ICD-10 M20.2-w/laterality

• Metatarsus primus elevatus—fixed elevated position of the 1\textsuperscript{st} metatarsal
  • ICD-10 M21.6X-
BUNIONS—WHAT DOES IT ALL MEAN?

• Primary cause metatarsus primus varus
  • Hallux valgus develops due to the bowstring effect of the tendons and muscles (flexor hallucis brevis and adductor hallucis)
  • As 1st metatarsal deviates away from the 2nd, pull of the muscle/tendon attachments causes the hallux to turn toward the 2nd toe
  • Prominence is the 1st MTH (only if metatarsus primus varus)
  • Thus principle procedures are to correct the deviation of the MT often then self-correcting the deformity of the hallux

• Bunion can be bony exostosis without deviation of underlying architecture generally caused by repetitive irritation overlying bursa (similar to calcaneal Haglund’s)
1st MTP angle should be $< 15^0$

1st-2nd intermetatarsal angle should be $< 9^0$ when weight bearing
BUNIONS

• The key to proper code selection = reading the body of the op note.
  ▪ Ostectomy or osteotomy
    ○ Physicians often tend to interchange
    ○ Osteotomy will redirect the position; -ectomy just removes bone
  ▪ Where- MT/phalanx/both; proximal/distal
  ▪ If TMT fusion was distal soft tissue release done
    ○ Release of adductor, capsulotomy/capsulorrhaphy
  ▪ Ignore epynonyms
**Hallux Varus**

- No single code or code set
- Code based upon what is done
  - Osteotomy MT 28306
  - Osteotomy phalanx 28310
  - Soft tissue release only 28270 or 28313
LESSER TOE DEFORMITIES

- Claw toe-extension deformity at MTP joint, flexion deformity at PIP and DIP
  - ICD-10 M20.5- other deformity toe, 5th for laterality
- Hammer toe-flexion deformity at PIP joint, often w/extension deformity at MTP
  - ICD-10 M20.4- 5th for laterality
  - Physicians often interchange terminology
- Mallet toe-flexion deformity at DIP
  - ICD-10 M20.5- other deformity toe, 5th for laterality
LESSER TOE DEFORMITIES PROCEEDURES

• Duvries resection arthroplasty/PIP fusion
  ▪ 28285 hammer toe correction (eg. Interphalangeal fusion, partial or total phalanectomy)
    o Thus not 28160 when performed for dx of hammertoe
    o Extensor tenotomy included *if done at the IP joint*
    o 28270 MP capsulotomy/capsular release/collateral ligament release w/extensor tenotomy *done at MTP joint* per AMA CPT Assistant and AAOS GSD separately reportable
      • Separate procedure designation, however done at different joint & often through separate incision
      • Done for contracture at MTP joint
      • Requires 59 modifier due to separate procedure designation
LESSER TOE DEFORMITIES PROCEDURES

• Weil osteotomy
  ▪ 28308 metatarsal osteotomy other than 1st
  ▪ Generally done when MT is long or has dropped
  ▪ Commonly capsule releases, and extensor tenotomy also done at MTP joint
    o Osteotomy is done at level of MT neck, extraarticular, thus 28270 should be able to be separately reported
      • Difficult to get paid
LESSER TOE DEFORMITIES PROCEDURES

• Flexor tenotomy
  - Percutaneous 28010 one tendon, 28011 multiple
  - Code reads “tenotomy, percutaneous, TOE; single (multiple)
    o Thus bill separately for each digit
    o Append both T and 59 modifiers if done with other procedures on same digit
    o Must be done through separate incision
  - Open, 28232, single tendon
    o Also separate procedure designation
    o Must be done through separate incision
  - Both can be difficult to get paid when done on same digit
LESSER TOE DEFORMITIES PROCEDURES

• 28270 vs 28313
  ▪ Should not be billed together as both encompass similar procedures
  ▪ Intent of 28313 is soft tissue reconstruction only to correct angular deformities of the toe
**Plantar Plate Repair**

- Strong ligament on bottom of the foot attaching base proximal phalanx to metatarsal (similar to volar plate in the hand)
  - Protects MTH from pressure and prevent overextension of toe
  - Helps prevent toes from splaying
- Currently no code available
- If the only procedure done, specialty societies have suggested 28313
- Otherwise unlisted and compare to 26540
- ICD-10 nontraumatic M24.27- disorder of ligament
  - traumatic S93.52- sprain of metatarsophalangeal joint toe
GIRDLESTONE/FLEXOR TO EXTENSOR TRANSFER

• Done for correction of clawtoe/hammertoe deformity
• Extensor tenotomy with transfer of flexor tendon to dorsum of toe, redirecting forces
• No tendon transfers exist for the toe
  • CPT Assistant June 2016 states report as 28285
GIRDLESTONE/FLEXOR TO EXTENSOR TRANSFER

Question: Is it appropriate to report code 28285, correction, hammertoe..for the correction of claw toes when performing extensor tenotomy with transfer of flexor tendon in the toe?

Answer: Yes, it is appropriate to report code 28285 for each toe, with the appropriate modifier appended to each code (eg. Modifier -59) to indicate the procedure is distinct when performed on a different toe than the first procedure.
Question: Please clarify whether it is appropriate to report code 28899 unlisted procedure, foot or toes, or code 28285, correction of hammertoe (e.g. Interphalangeal fusion, partial or total phalangectomy), when a toe tendon is transferred to correct a hammertoe, clawtoe, or crossover toe deformity?

Answer: It is appropriate to report code 28285 for the repair of a hammer toe. The tendon transfer is an inclusive component in the repair of a flexible hammertoe.
ARTHROPLASTY BRIEFLY

• Does not mean that a prosthesis is being inserted.
• Arthro=joint +
• -plasty=repair or restoration of a part or function
• Combined simply means surgical repair of a joint in order to relieve pain, restore function, restore motion
• Generally done for arthritis, joint ankylosis
• ≠ always mean prosthetic placement
• Can involve partial removal of bone (osteophytes) to complete excision of bone(s) or joint surfaces
• Listed under Repair, Revision and/or Reconstruction subsection
Arthroplasty Briefly

- MTP resection arthroplasty = excision of MTH
  - 28111-28114
    - 28114 includes excision of base of proximal phalanx
    - 28112=2-4 only
    - 28111=1st only
    - 28113 = 5th only

- Duvries resection arthroplasty = 28285

- Interposition arthroplasty = no code for the foot; unlisted and compare w/ hand/wrist
HALLUX VALGUS
METATARSUS PRIMUS VARUS
HALLUX VALGUS
METATARSUS PRIMUS VARUS
Hallux Varus
Hallux Varus

Normal alignment

Hallux varus
ARTHROPLASTY ANKLE

• Does the procedure involve replacement of the joint surface with a prosthesis? If yes 27702.
  • Removal of osteophytes is included
  • Removal of previously placed hardware is included if needed to remove to perform procedure

• If no, what was done to the joint surface?
  • Removal of osteophytes from tibia 27635
  • Removal of osteophytes from talus 28100
  • Or Arthroplasty ankle 27700
TENDONS AND LIGAMENTS
The Foot and Ankle
Ligament

• 27695-repair, primary, disrupted ligament, ankle; collateral
• 27696-repair, primary, disrupted ligament, ankle; both collateral ligaments
  ▪ Does not mean two ligaments but one or more from the lateral AND medial ligament complex
• 27698-repair, secondary, disrupted ligament ankle; collateral
  ▪ Brostrom, Brostrom-Gould, Evans
  ▪ Generally for chronic injuries but can be acute
• Per CPT Assistant primary vs secondary has no relationship to timing from injury. Primary is repair of the two ends of the ligament or reattachment to bone. Secondary utilizes other tissue to help with the repair thus is a reconstruction
TENDON

• Flexor or extensor
• At what level (foot or ankle)
• Primary same as for ligament
• Secondary generally involves clean up of diseased tendon then repair or grafting
• Tendon clean up look at tenolysis codes
• Tenodesis-Is the tendon insertion being moved or is the muscle being redirected by inserting into another tendon?
  ▪ Tendon transfer
HAGLUND’S DEFORMITY

• Bone overgrowth at the attachment of the Achilles tendon
  ▪ ICD-10 25.77(3/4/5/9) osteophyte foot; needs laterality
• Due to chronic Achilles tendonitis/bursitis
HAGLUND’S DEFORMITY

• Surgical treatment generally involves excision of the bony exostosis CPT 28118 partial excision bone calcaneus

• May include debridement of the Achilles CPT 27680 OR debridement of the tendon with repair CPT 27654
  ▪ If Achilles had significant disease, often another tendon (FHL) is transferred to help provide strength and power to the Achilles CPT 27691
  ▪ Can only report repair of the tendon, if the removal was not just for exposure to the exostosis

• Tendon clean up look at tenolysis codes
MORE TENDON

• Tenodesis-Is the tendon insertion being moved or is the muscle being redirected by inserting into another tendon?
  ▪ Tendon transfer 27690, 27691

• 27690 Transfer or transplant of single tendon (with muscle redirection or rerouting); superficial (eg. anterior extensors into midfoot)

• 27691 Transfer or transplant of single tendon (with muscle redirection or rerouting); deep (eg, anterior tibial or posterior tibial through interosseous space, flexor digitorum longus, flexor hallucis longus, or peroneal tendon to midfoot or hindfoot)

• 27692 each additional
  ▪ If both superficial and deep, payors will not accept both codes even w/59, have to use add on code
  ▪ Bridle Procedure 27691 and 27692

• No specific definition of superficial vs deep; advise from several “experts” has been if the tendon itself is deep use deep or if transferring through deep bone structures
  • Transfers are often performed by drilling a hole into the bone to then allow for attachment. Would not be considered deep.


ARTHRODESIS

The Foot and Ankle
ARTHRODESIS

- Ankle-27870
  - Ostectomy distal fibula not separately reportable
  - Tibiotalar fusion

- Tibiototalocalcaneal 27870 plus 28725
  - 22 modifier if documentation supports
  - Complex fusions
  - Generally done due to destruction of talus with marked bone loss
  - Fixation with intramedullary rod
ARTHRODESIS

• Subtalar 28725-talocalcaneal
• Triple 28715 calcaneocuboid, talonavicular and talocaneal
• Pantalar 28705-tibiotalar, subtalar, calcaneocuboid and talonavicular
• 28740-tarsometatarsal or intertarsal single
• 28730-tarsometatarsal or intertarsal multiple/transverse
• 28735-tarsometatarsal or intertarsal multiple/transverse with osteotomy (flat foot correction)
ARTHRODESIS

• AAOS and CCI bundle osteotomy into all of the arthrodesis codes
  ▪ Technically these involve ostectomies (removal of bone), not osteotomies (redirection of bone)
  ▪ Osteotomies unrelated to arthrodesis (proximal metatarsal, bones not involved in fusion) difficult to get paid
FRACTURES

The Foot and Ankle
ANKLE

- Maisonneuve-fracture medial malleolus w/fracture proximal fibula; may also have fracture of posterior malleolus, rupture of deltoid ligament, rupture of anterior tibiotalar ligament
ANKLE

- Bimalleolar-fracture of medial and lateral or medial and posterior or lateral and posterior malleoli
- Bimalleolar equivalent-fracture of medial or lateral malleolus with tear of deltoid ligament
  - Should not be coded as repair of bimalleolar fracture
- Trimalleolar-fracture of medial, lateral AND posterior malleoli
  - Two ORIF codes depending upon whether posterior malleolus is repaired w/internal fixation
  - Still use trimalleolar fracture diagnosis but must have documentation of fractures of all three
ANKLE

• Pilon/Plafond-intraarticular fracture of weight bearing surface of tibia S82.87-
  ▪ Can have coexisting fracture of fibula
  ▪ Due to high energy vertical loading due to a fall from a height or MVA

• Tillaux-fracture of lateral half tibial epiphysis after closure of medial half often with distal fibula Salter III S89.13-

• Triplane-ankle fracture (tibia) in three planes, three parts and intraarticular S82.89-
Salter Harris II with fibula shaft fracture
SYNDESMOSIS

• Syndesmosis ligaments:
  ▪ Anterior-inferior tibiofibular ligament (most commonly injured)
  ▪ Posterior-inferior tibiofibular ligament
  ▪ Transverse tibiofibular ligament
  ▪ Interosseous ligament
  ▪ Inferior transverse ligament

• Per CPT Assistant and CCI may separately report fixation of the syndesmosis if either through a separate incision or separate fixation device, sort of

• Open-27829; no code for percutaneous or arthroscopic thus unlisted
  ▪ Type of fixation used is irrelevant-screw, tightrope

• Diagnosis: Dislocation S93.04- vs Sprain S93.43-
  ▪ Frequently also includes instability M25.37-
SYNDESMOSIS

Figure 1. Anterior inferior tibiofibular syndesmosis.

Figure 2. Posterior inferior tibiofibular syndesmosis.

https://kumc-ptrs-ebp.wikispaces.com
SYNDESMOSIS

“Question: A patient was seen for a left ankle fracture dislocation with fractured lateral malleolus, disruption syndesmosis, and complete tear of the deltoid ligament. The physician performed an open reduction and internal fixation lateral malleolus, open repair of medial deltoid ligament, and repair of syndesmosis of the distal fibular tibial articulation. Is it appropriate to report CPT code 27829, Open treatment of distal tibiofibular joint (syndesmosis) disruption, including internal fixation, when performed, to describe this procedure?

Answer: It would be appropriate to report CPT code 27792, Open treatment of distal fibular fracture (lateral malleolus), includes internal fixation, when performed, for the lateral malleolus fracture that includes the syndesmosis repair if a screw is put through the plate and into the tibia. Report CPT code 27695, Repair, primary, disrupted ligament ankle; collateral, for the deltoid ligament repair. Code 27695 would be subject to modifier 51 in this circumstance. CPT code 27829, Open treatment of distal tibiofibular joint (syndesmosis) disruption, includes internal fixation, when performed, is reported for the syndesmosis repair (subject to modifier 51) if a separate incision is made.”

CPT Assistant 2/28/09
SYNDESMOSIS

“Question: A patient has a bimalleolar ankle fracture (lateral and posterior malleolus). A lateral fibular plate is used for repair of the lateral malleolar fracture. A reduction is performed, but no fixation is needed to repair the posterior malleolar fracture. A cotton test indicates widening of the syndesmosis; therefore, reduction of the syndesmosis is performed and two screws are placed through the fibular plate. Is it appropriate to report code 27829 in addition to code 27814 in this case? Answer: It would be appropriate to report CPT code 27814, Open treatment of bimalleolar ankle fracture (eg, lateral and medial malleoli, or lateral and posterior malleoli, or medial and posterior malleoli), includes internal fixation, when performed, for the bimalleolar fracture repair. For the syndesmosis repair, append modifier 51 to code 27829, Open treatment of distal tibiofibular joint (syndesmosis) disruption, includes internal fixation, when performed. “ CPT Assistant 01.31.16
LISFRANC

- Lisfranc- involves tarsometatarsal joints, intertarsal and intermetatarsal joints; may involve fractures of tarsals and or metatarsals, dislocations of TMT or intertarsal joints or sprains of the ligaments
LISFRANC

Normal
LISFRANC
**LISFRANC “FRACUTURE-DISLOCATION”**

- Imperative to read the operative report and have clear clinical documentation to determine diagnoses and procedures
- Treatment of disruption of intertarsal joints
  - No code for intertarsal, use dislocation tarsal
  - 28545, 28546, 28555
  - Codes do not read each, bill multiple lines w/59
- Treatment of disruption of tarsometatarsal joints
  - 28605, 28606, 28615
  - Codes do not read each, bill multiple lines w/59
- Treatment of fractures
  - Can only code for those fractures that are not part of the fixation of the joint disruptions
- Cannot bill for closed management if billing for percutaneous or open treatment
- Primary treatment by fusion
**LISFRANC “FRACTURE-DISLOCATION”**

- Diagnosis will be based upon documentation
- Fracture: metatarsal, tarsal
- Dislocation
- Sprain
- Add instability M25.37- if documented
- No single defined code in ICD-10
**POSTOPERATIVE DIAGNOSIS:** Right foot Lisfranc fracture dislocation (first, second, third, fourth tarsometatarsal joint dislocations).

**PROCEDURE PERFORMED:** Open reduction and internal fixation of right foot first, second, third and fourth tarsometatarsal joint fracture dislocations.

**ANESTHESIA:** General.

**SPECIMENS:** None.

**COMPLICATIONS:** None.

**INDICATIONS:** This is a 46-year-old man who twisted his foot, sustaining a fracture dislocation through his mid foot. He is taken to the operating room to undergo ORIF.

**DESCRIPTION OF PROCEDURE:** After informed consent had been obtained, the patient was identified, taken to the operating room and after successful induction of general anesthesia, the right lower extremity was prepped and draped steriley. Appropriate intravenous antibiotics were administered within 30 minutes of the incision and prior to inflating the tourniquet. The tourniquet was then inflated. We made a dorsal incision just between the first and second metatarsals. We carried this proximally to the first and second TMT joints. We identified these. There was noted to be gross instability of the first TMT joint with a fracture dislocation of the second. There was a comminuted intraarticular fracture of the second TMT joint. We reduced these and temporarily pinned things with K-wires. We confirmed adequate reduction of the medial column. We then fixed the medial column by placing a Synthes 2.7 mm four-hole LCDC plate dorsally across the second TMT joint. We then placed a 4 mm cortical screw using lag technique from the medial cuneiform into the base of the second metatarsal and placed another lag screw, 4 cortical screw, from distal to proximal across the first tarsometatarsal joint and finally a 4 cortical screw from medial to lateral from the first metatarsal base into the second. This restored alignment of the medial column, closed down the Lisfranc's joint. We confirmed appropriate reduction with C-arm.

<table>
<thead>
<tr>
<th>Incision</th>
<th>Procedure</th>
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<tbody>
<tr>
<td>Lateral over the fourth tarsometatarsal joint</td>
<td>We exposed the third, fourth and part of the fifth TMT joint through this incision. There was a large displaced intraarticular fracture of the base of the fourth metatarsal. We reduced this. After the piece was rotated about 180 degrees, we put it back in position. We then aligned the fourth TMT joint appropriately and fixed this using a spanning bridge plate placed across the fourth TMT joint. We placed two screws distally and two screws proximally into the cuboid. We inspected the third TMT joint. The reduction was concentric; however, there was some severe marginal impaction of the lateral most aspect of the lateral cuneiform. There was gross instability of the third TMT joint as well. We decided to therefore bridge plate this as well and we used a four-hole 1/3 tubular 2.7 mm plate. We placed one screw proximally and one distally across the</td>
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We then made a second incision laterally over the fourth tarsometatarsal joint. We exposed the third, fourth and part of the fifth TMT joint through this incision. There was a large displaced intraarticular fracture of the base of the fourth metatarsal. We reduced this. After the piece was rotated about 180 degrees, we put it back in position. We then aligned the fourth TMT joint appropriately and fixed this using a spanning bridge plate placed across the fourth TMT joint. We placed two screws distally and two screws proximally into the cuboid. We inspected the third TMT joint. The reduction was concentric; however, there was some severe marginal impaction of the lateral most aspect of the lateral cuneiform. There was gross instability of the third TMT joint as well. We decided to therefore bridge plate this as well and we used a four-hole 1/3 tubular 2.7 mm plate. We placed one screw proximally and one distally across the
POSTOPERATIVE DIAGNOSIS: Right foot Lisfranc fracture dislocation.

PROCEDURE:
1. Open reduction and internal fixation of right foot Lisfranc fracture dislocation.
2. Right foot first and second tarsometatarsal joint arthrodesis.
3. Local bone graft, right foot.

ANESTHESIA: General.

SPECIMENS: None.

COMPLICATIONS: None.

INDICATIONS: This is a 30-year-old man who had a twist injury to his right foot, sustaining a primarily ligamentous Lisfranc fracture dislocation on the right side. He was taken to the operating room to undergo repair with primary arthrodesis.

DESCRIPTION OF PROCEDURE: After informed consent had been obtained, the patient was identified, taken to the operating room. After successful induction of general anesthesia, the right lower extremity was prepped and draped sterile. Appropriate intravenous antibiotics were administered within 30 minutes of incision and prior to inflating the tourniquet. The tourniquet was then inflated. A long longitudinal incision was made over the dorsum of the foot between the first and second metatarsals. I carefully exposed the first and 2nd TMT joints as well as Lisfranc joint. There was noted to be gross instability with dorsal subluxation of the second TMT joint. The first TMT joint was also grossly unstable with lateral subluxation of the first ray. We identified each of these joints. We removed interposing soft tissue. We prepared each joint for arthrodesis by removing all articular cartilage from both sides of each joint. We used a high speed bur to roughen the subchondral bony surfaces to create a healthy bleeding bony surface for fusion. We cut several strips of the Synthes conform bone graft substitute. We packed this within the joint. We then reduced each joint anatomically. We started with the first TMT joint and pinned this temporarily using a K-wire. We then also reduced the second TMT joint and held it with a reduction clamp. We confirmed anatomic reduction of the first and second TMT joints both clinically as well as with C-arm images. Once we were satisfied that the reduction was appropriate, we fixed each of the fusions. We used Synthes 4 mm cortical screws, all inserted using lag technique. One screw was inserted from distal to proximal across the first TMT joint. We then placed a screw from the base of the medial cuneiform into the second metatarsal. Next, we placed a screw from the second metatarsal into the middle cuneiform and then a fourth screw from the middle cuneiform into the second metatarsal and finally a screw from the base of the first metatarsal into the second. All screws had excellent purchase. We removed the temporary fixation. We confirmed appropriate reduction again both clinically as well as radiographically with AP, lateral and oblique C-arm images of the right foot, which were interpreted by myself. These demonstrated appropriate reduction of each joint with good position of the hardware. We irrigated all wounds thoroughly. We had saved the drillings from the drill bits and used this as a local bone graft which we had packed.
Thank You

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RESOURCES

Websites
• aaofas.org
• www.footeducation.com (videos)

• A Manual of Orthopaedic Terminology, F. Nelson, C. Blauvelt
• Orthopaedic Coding Illustrated Lower, Decision Health