IN THE NAME OF GOD

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Midfoot arthritis is a common cause of significant pain and disability of foot.
Etiology of midfoot arthritis includes:

- Primary process
- Inflammatory process
- Post traumatic degeneration
Foot and ankle injuries have increased in number with the advent of airbags.

This is because of the shift in energy during crashes and the resulting trauma to the relatively unprotected foot.
Occupant height was a significant variable in determining the effectiveness of the airbag in preventing injury.

Occupants shorter than 4 ft 6 in (148 cm) had an increased incidence of injury.
Midfoot Anatomy & Biomechanics
The *midfoot* has been divided into 3 longitudinal anatomic columns:

1. **Medial**
2. **Middle**
3. **lateral**
The *medial column* is composed of:

1. *medial cuneiform*
2. *first metatarsal*
The **middle column** is made up of:

1. second metatarsal
2. third metatarsal
3. Intermediate cuneiforms
4. lateral cuneiforms
The **lateral column** is composed of:

1. **cuboid**
2. **fourth metatarsal**
3. **fifth metatarsal**
The navicular bridges the medial and middle columns.
The **Lisfranc complex** encompasses the five metatarsal bases and their respective cuboid or cuneiform articulations.

stability of these articulations is provided by:
1. stout ligamentous attachments
2. bony configuration of the joints

The ligamentous anatomy can be divided into plantar, interosseous, and dorsal components.
The **interosseous** and **plantar intermetatarsal ligaments** are the strongest stabilizers of this construct, and the dorsal ligaments are the weakest.
In the coronal plane, the bones of the Lisfranc joints have a Roman arch configuration, with the apex at the second metatarsal.
there is no ligament at the 1-2 intermetatarsal base.

there is a second metatarsal base—medial cuneiform oblique ligament (Lisfranc ligament).
midfoot complex + Chopart joint allow the center of the load to be effectively transferred through the midfoot or TMT joints to the forefoot during gait.
The lateral articulations between the cuboid and the fourth and fifth metatarsals (lateral column) are significantly more mobile than in the central or medial columns.
The middle cuneiform–second metatarsal articulation has the least amount of motion in the midfoot (<4° in the sagittal plane), likely as a result of its anatomic constraints.
medial tarsometatarsal (TMT) joints provide <7° of sagittal plane motion
Pathologic conditions of the midfoot often lead to pain and, potentially, instability.

Loss of midfoot stability may manifest as abnormal foot posture and collapse of the longitudinal arch, causing increased tensile loading on the plantar ligaments, resulting in foot pain.
Etiology and Presentation
Midfoot arthritis has multiple etiologies:

1. **inflammatory disorders**
2. **gout**
3. **neuropathic degeneration.**
4. **primary degradation of the cartilage**
5. **Posttraumatic change resulting from fracture or dislocation of the midfoot bones**
The most common area of midfoot injury is the Lisfranc joint complex.

The outcomes of these injuries correlate with the degree of anatomic incongruency of the Lisfranc joints.
Midfoot arthritis may also result from the structural abnormalities from advanced adult acquired flatfoot.

These changes are characterized by:

1. valgus of the calcaneus
2. forefoot abduction
3. loss of the longitudinal arch.
Physical Examination & Imaging
First & second TMT joint tend to be the most tender in persons with midfoot arthritis.
Weight-bearing AP
Lateral
internal rotation oblique radiographic views of the foot

are helpful in the diagnosis and can characterize the location and extent of arthrosis.
Radiographs of persons with primary degenerative arthritis may demonstrate a more pronated foot position than is seen with traumatic midfoot arthritis.

This position manifests as:

1. lower medial cuneiform height
2. negative talo–first metatarsal angle
Lateral weight-bearing radiographs may also demonstrate sagging of the medial column, either at the naviculocuneiform or talonavicular joint.
Management
Nonsurgical

Strategies implemented to relieve symptoms center on the:

1. improvement of midfoot stability
2. modification of load on the arthritic joints
**NSAIDs** are the standard first-line treatment of arthritic joint pain.
effectiveness of adjuvant treatments (eg, selective injection of hyaluronic acid or cortisone) on midfoot arthritis pain is lacking.
Shoe modifications and orthotic inserts are the mainstay of nonsurgical management for midfoot arthritis
Shoe modifications and orthoses relieve symptoms by modifying the load borne by the midfoot.
Stiff-soled shoes and rocker-bottom shoes have been used in an attempt to facilitate the transfer of weight during gait
Stiff carbon fiber full-length inserts can also be used to simulate a stiff-soled shoe.

These inserts can be transferred between multiple pairs of shoes.
By restricting first metatarsal ROM during walking, the full-length carbon insert may help in alleviating symptoms.

Greater restriction of foot and ankle ROM through aggressive bracing may also provide relief of symptoms.
Surgical intervention can be challenging for many reasons:

1. *the complex anatomy of the region*
2. *difficulty in identifying the specific joints to be treated*
3. *the potential for unsuccessful fusion of these multiple articulations*
Surgical intervention may be indicated in:

1. patients with symptoms that have failed to respond to all nonsurgical therapy

2. patients who believe that the severity of their symptoms necessitates additional treatment.
Arthrodesis of the medial and middle columns is the mainstay of surgical treatment in persons with arthritis of the TMT and naviculocuneiform joints.
Achievement of stability in the medial and middle columns requires that the first, second, and, potentially, third TMT joints be included in the arthrodesis along with the corresponding intercuneiform joints.
The surgical technique requires:

1. restoration of the mechanical alignment of the foot
2. adequate preparation of the bony surfaces
3. rigid stabilization with lag screws and/or plates.
In midfoot arthrodesis, longitudinal incisions are placed *between the first and second metatarsals*, and one incision is placed *overlying the fourth metatarsal*. 
Surgical complications:

1. Nonunion occurs in 3% to 7% of patients
2. Postoperative Neuroma
3. Symptomatic hardware in 9%
4. Metatarsal stress fractures
5. Metatarsalgia
6. Adjacent joint arthritis
Age and mechanism of injury have not been found to be significant predictors of outcomes after arthrodesis.
Several suggest that bony fusion of these rays may lead to other complications.
fusion of the cuboid articulations with the base of the fourth and fifth metatarsals may lead to:

1. chronic lateral foot pain
2. increased rate of nonunion
3. developing stress fractures
4. prominent or broken hardware
5. subjective lateral foot stiffness
Arthrodesis of the fourth and fifth metatarsal joints can produce good outcomes in patients with:

1. lateral midfoot collapse
2. rocker-bottom deformity
3. severe arthritic degeneration that is recalcitrant to nonsurgical management.
There is no strict contraindication to lateral column arthrodesis.
Alternative procedures have been developed to maintain motion of the fourth and fifth TMT joints while providing symptom relief.
Lateral TMT joint resection with peroneus tertius soft-tissue interposition.
Another proposed motion-preserving alternative is ceramic interpositional arthroplasty.
Patients were transitioned to weight-bearing activities at 6 weeks postoperatively
Senior Author’s Preferred Technique
surgical management only after the patient has failed all nonsurgical options.
Approximately 60% pain relief.

Gait may remain limited

in 10% of patients, complication rates necessitate a second surgery.
asked to identify the location of the pain

weight-bearing radiographs are obtained

the medial naviculocuneiform joint is included in the arthrodesis.

Heel cord lengthening is performed in the patient with limited dorsiflexion
A popliteal block is used in conjunction with a spinal or general anesthetic for postoperative pain control.

A calf or thigh tourniquet can be used.

An incision is made between the first and second TMT joints.
The first TMT joint is prepared with the curet, after which it is drilled with a Kirschner wire to infract the subchondral bone to facilitate fusion.

The second TMT and the intercuneiform joints are prepared in a similar fashion.
If necessary, the third TMT joint can be approached through a second incision made longitudinally on the lateral edge of the fourth metatarsal base.
Stiff, thin plates are placed along the dorsal aspect of the repair.
AP, lateral, and oblique views of the foot are obtained intraoperatively using mini-fluoroscopy to aid in the reduction and confirm hardware placement.
The skin is closed with 3-0 nylon suture.

If a nerve block was not administered preoperatively, an ankle block is performed with 0.25% bupivacaine hydrochloride for postoperative pain control.

A bulky dressing and posterior splint are applied.
- Foot elevation
- non–weightbearing
- 1 week postoperatively: dressing change and cast application
- At 3 weeks: change dressing and cast & removed sutures
- remain non–weight-bearing for 3 months.
- Radiographs of the foot are obtained at 6 and 12 weeks
The patient is placed in a walking boot at 12 weeks, and physical therapy is begun for ankle and toe rehabilitation
The transition from the boot to a shoe occurs based on the patient’s tolerance.
Final outcome of the fusion is not known until 1 year after surgery.
THANK YOU