Minimally Invasive Foot and Ankle Surgery

MR. RAJIV LIMAYE
DR. MAYUR PATIL

DEPARTMENT OF ORTHOPAEDICS
NORTH TEES HOSPITAL
Minimally Invasive Surgery

- Minimally invasive foot and ankle surgery (MIS) is a method that allows interventions causing minimal trauma to surrounding tissue through smaller incisions and with or without direct exposure of surgical planes.

- Include – Arthroscopic surgeries, Small incision non arthroscopic surgeries under x-ray guidance, percutaneous procedures.
Minimally Invasive Surgery - Advantages

- Reduction in tissues trauma
- Reduced surgical time
- Less post operative adhesions/fibrosis
- Minimal external scars
- Reduced joint stiffness
- Day case surgery
- Faster recovery
- Quicker return to daily activities
Minimally Invasive Surgery - Challenges

- Requires special training
- Steep learning curve
- Requirement of specialized instruments
- Requires intricate anatomy knowledge
- Cadaveric course training if possible
Ankle Arthroscopy - History

- 1931 - Burman used 4.0mm sheath without distraction
- 1939 - Tagaki developed a 2.7mm arthroscope.
- 1972 - Watanabe developed a self-focusing 1.7mm arthroscope
- 1988 - Guhl used a skeletal distractor for the ankle
- 1988 - Yates developed a non-invasive distraction technique.
Ankle Arthroscopy - Indications

- Diagnostic and Therapeutic
- Osteochondritis disseicans
- Arthrofibrosis
- Ankle Impingement (Anterior and Posterior)
- Synovitis
- Loose bodies
- Infections
- Ankle fractures
- Lateral ligament instability
- Ankle arthrodesis
Ankle Arthroscopy - Contraindications

- Local soft-tissue infection
- Poor vascularity
- Severe edema
- Lymphoedema
Ankle Arthroscopy - Technique

- 30 degree wide angle - 2.7 mm arthroscope
- pump set for a pressure of 50 mm;
- mechanical distraction device
- High ankle block
- Portals –commonly used - antero-medial, antero-lateral, postero-lateral
- Sequential examination (21 point)
- Arthroscopic debridement, micro-fracture, repair as per the pathology
Ankle Arthroscopy – Complications

- Neurovascular damage
- Chronic regional pain syndrome
- Infection
- DVT/PE
- Stiffness
- Damage to articular surface
Subtalar Arthroscopy

- **Indications** - subtalar impingement, chondromalacia, osteophytes, arthrofibrosis, synovectomy, removal of loose bodies, coalition, os trigonum, subtalar fusion

- **Contraindications** - advanced degenerative joint disease, poor vascularity, soft tissue infection
Subtalar Arthroscopy - Technique

- Three standard portals – anterior, middle and posterior portal
- Inspect from anterior portal - sinus tarsi, the anterior process of the calcaneus, and anterior joint, postero-lateral gutter
- From posterior portal - central talo-calcaneal joint, interosseous ligament, postero-lateral recess, posterior gutter and postero-lateral corner of the talus
- Joint debridement, removal of scar tissue, subtalar joint fusion etc, other procedures as required.
Sub talar arthroscopy
Subtalar Arthroscopy-Complications

- Sural nerve and superficial peroneal nerve injury
- Infection
- Articular cartilage damage
- Damage to articular surface
Minimally Invasive Hallux Correction

- Multiple small stab incisions unlike the traditional large incision.
- Percutaneous release of the fibular sesamoid ligaments and conjoined tendon of the adductor hallucis under image intensifier.
- Chevron osteotomy through a small stab incision with a burr
- Frequent use of image intensifier.
- Cannulated screws for osteotomy fixation.
- Various techniques described - SCOT (percutaneous) technique, Bösch technique, Isham technique
Bunion procedures

- With similar technique using small incision and use of burr following osteotomies can performed as well
  - Akins osteotomy
  - Basal osteotomy
  - Simple bunionectomy
MIS Bunion correction
Minimally Invasive Hallux Correction - Complications

- Mal-alignment
- Recurrence of deformity
- Nonunion/Mal-union of osteotomy
- Infection
- Post operative stiffness
Other MIS

- Percutaneous Arthrodesis of Inter-phalangeal Joints of the Lesser Rays –
  - Dorsal approach
  - 2-3 mm arthrotomy
  - Micromotorised Lindemann bone cutter
  - Intramedullary K wire
Percutaneous Distal Osteotomy of the Fifth Metatarsal (Bunionette)

- Ankle block
- Percutaneous 2 mm k wire in paraosteal position
- Osteotomy with Lindemann bone cutter
- Osteotomy stabilized by k wire.
Percutaneous Osteotomy of Lesser Metatarsal Bones

- oblique extra-articular osteotomy of the metatarsal neck using a Lindemann bone cutter,
- 45 degree inclination on the axis of the metatarsal bone, from distal-dorsal to plantar-proximal,
Lesser metatarsal MIS
Percutaneous Alcoholization for Interdigital Neuritis (Morton’s Neuroma)

- Endoscopic decompression of the intermetatarsal nerve entrapment.
- Alcoholization with phenol or ethanol by a percutaneous approach - dorsal intermetatarsal approach, the nervous branch is localized by an electrostimulator or sonography; using an electrode-needle of 2 ml. amount of 5 percent concentration phenol or 90 percent concentration ethanol is injected.
Endoscopic mortons neuroma excision
Hindfoot MIS

- percutaneous calcaneal displacement osteotomy
  - Under fluoroscopic guidance the osteotomy is planned and marked on the skin
  - Three stab incisions made, subperiosteal tunnel created
  - Osteotomy performed with a small gigli saw passed under the tunnel
  - Correction made and osteotomy fixed with percutaneous cannulated screws
Calcaneal osteotomy/ fixation
Tendoscopy

- A type of minimally invasive procedure involving endoscopy of a tendon
- Stab incisions
- Tendon sheeth expanded with fluid
- Scope is passed along the tendon sheeth to examine the pathology
- Tendoachillis tendoscopy – For tendon repair, treat tendinopathy, tenotomy and tendon lengthening

- Peroneal Tendoscopy -
  - Indications - peroneal adhesions, tenosynovitis, tendon rupture, recurrent peroneal tendon subluxation, and intrasheath peroneal tendon subluxation.
  - Tendoscopic synovectomy, tendon suturing.

- FHL Tendoscopy – Generally in conjunction with other procedures during hindfoot endoscopy. FHL can be harvested via tendoscopy. Tendoscopic tendon transfer of FHL, Tendoachilis augmentation.
Tibialis Posterior Tendoscopy –

- Indications - Dislocation, tenosynovitis, tendinopathy (insertional and non-insertional), and post-traumatic adhesions.

- Tendoscopy of the following tendons is less common-
  - Tibialis anterior
  - Ext hallusis longus
  - Ext digitorum longus
Conclusion

- MIS techniques are reliable with comparable results to traditional open approaches.
- Surgical time and recovery time can be reduced as a result of less soft tissue injury.
- Steep learning curve due to small operating field, difficult landmarks.
- Slowly and steadily progressing as the future of most of the foot and ankle surgeries.