The Role of the Arthroscope With Ankle Fractures:
When I Use It and Why!

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I. ADVANTAGES OF ARTHROSCOPY
A. Arthroscopy enables the surgeon to:
   1. Assess intraarticular structures and correct abnormalities
   2. Reduce and internally fixate intraarticular fractures
   3. Evaluate and treat chronic pain and loss of motion after fracture

B. Video documentation for present and future assessment of articular surfaces

II. ACUTE ANKLE FRACTURES
A. Introduction
   1. Arthroscopy enables us to evaluate the articular surface in the acute state after fracture
   2. Limits of evaluation and treatment are unknown since this is a newer technology
   3. More experience necessary to clinically assess results

B. Indications for Acute Ankle Fractures
   1. Minimal to mild displacement easily reducible by manipulation
   2. Minimal to mild ankle swelling
   3. No neurovascular injury
   4. CONTROVERSIAL: Arthroscope all intra- and extraarticular fractures to look for loose bodies, osteochondral lesions, and ligament injury

C. Contraindications – Acute Fractures
   1. Moderate or more ankle swelling
   2. Neurovascular injury
   3. Open fracture
   4. Fracture displacement (?)

D. Technique for Acute Fracture Fixation via Arthroscope
   1. Supine with thigh and ankle holder
   2. Total patient relaxation
   3. Distractor rarely
   4. 2.7 mm short 30° arthroscope
   5. High flow-suction
   6. Use AM, AL, PL portals
   7. Remove clot, debris, OLT and loose bodies
   8. Examine entire joint
   9. Reduce appropriate fracture under fluoroscopy
   10. Fix fracture with cannulated screws
   11. Do not accept a step-off of the articular surface
   12. Utilize posterior splint after surgery with compression dressing
13. Stable reduction allows earlier motion

E. Technique for Combination Arthroscopy and Open Reduction and Internal Fixation
1. Do arthroscopy first
2. Technique same as previously described above
3. Remove all clot, debris, chondral and osteochondral lesions
4. Carefully assess fracture
5. After arthroscopy, wipe ankle with Betadine and add an additional clean drape
6. Change gloves and instruments
7. Proceed to ORIF

F. SCOI Results for Acute Ankle Fractures (Loren and Ferkel) (2002)
1. 46 patients
2. Average age = 36 years
3. Interval from injury to surgery = 7 days
4. Traumatic articular surface injuries (TASLs) = 61%
5. 75% of fractures with syndesmosis disruptions sustained significant damage to the talar articular surface
6. Full range of motion, 39; slight loss of dorsiflexion, 5; moderate loss of dorsiflexion, 1; arthrofibrosis, 1
7. 46 out of 46 healed

G. Hintermann et al. (2000)
1. Arthroscoped 288 acute ankle fractures
2. Cartilage lesions seen 79% of time
   a. talus – 69%
   b. distal tibia – 46%
   c. fibula – 45%
   d. medial malleolus – 41%

H. Thordarson et al. (2001)
1. 19 patients were prospectively randomized for operative treatment of their ankle fracture with or without ankle arthroscopy
2. All patients had an SER or a PER fracture
3. 10 patients control; 9 patients plate fixation + arthroscopy
4. Average follow-up 21 months
5. 8 of 9 patients had articular damage to the talar dome on arthroscopy
6. No difference seen in SF-36 scores or lower extremity scores between two groups

I. Chu and Chun (2002)
1. Results of arthroscopy with ankle fractures presented at the Annual Meeting of the AOFAS
2. Reviewed MRIs of 40 patients with ankle fractures retrospectively; found 70% of the fractures had an osteochondral lesion of the talus
3. 46% of cases (13) were in the supination group and 54% (15) were in the pronation group
4. Found most lesions were in the posterolateral area of the talar dome
5. They suggested that MRI imaging should be routinely considered with surgical repair of ankle fractures
J. Ono et al. (2004)
1. 105 patients with malleolar fractures and surgical fixation
2. Cartilage damage seen in 21 patients
3. Syndesmosis fixation in 8 patients

K. Ferkel and Hommen (2005)
1. 4 Tillaux fractures treated arthroscopically
2. Long term results with follow-up x-rays and exam found all patients to be fully healed, active in their sports, and without pain

L. Lui et al. (2005)
1. 53 ankle fractures without radiographic evidence of frank syndesmosis diastasis
2. Intraoperative stress radiographs and ankle arthroscopy were performed
3. Syndesmotic screws were inserted based on findings
4. 16 patients had positive intraoperative stress x-rays; 35 cases had positive arthroscopic findings of syndesmosis diastasis
5. Ankle arthroscopy is better than intraoperative stress radiograph in detecting syndesmosis disruption

M. McGillion et al. (2007)
1. Performed arthroscopic assisted percutaneous fixation of triplane fractures in 4 patients
2. All patients achieved excellent reduction and stable fixation
3. All patients regained full range of motion in 6 weeks
4. This method was felt to be helpful

N. Jennings et al. (2007)
1. Juvenile intraarticular epiphyseal ankle fractures in 6 patients
2. 5 patients had triplane fractures and 1 had a juvenile Tillaux fracture
3. All were fixed arthroscopically assisted
4. All patients returned to full activity within 14 weeks of surgery and had full range of motion

O. Yoshimura et al. (2008)
1. Arthroscopic findings in Maisonneuve fractures in 4 patients
2. All patients had cartilage damage to the medial aspect of the talar dome, but no lateral lesions were observed
3. Cartilage debris and hemarthrosis seen in all patients; each ankle had a tear of the AITFL and interosseous TF ligament
4. All were treated with debridement

P. Aktas et al. (2008)
1. Chondral lesions of the talar dome and ankle fracture types in 86 patients
2. There was significantly greater incidence of chondral lesions associated with the distal fibular fractures
3. The AOFAS Score was 96 among all fractures
4. They felt inspection of the talar dome should be done routinely in repair of ankle fractures
Q. Schuberth et al. (2008)
1. Arthroscopy-assisted repair of latent syndesmotic instability in 6 patients
2. All patients sustained rotational ankle injury
3. All patients had scope assisted repair and percutaneous fixation of the disrupted ankle mortise
4. Minimum follow-up 2 years
5. All patients had improvement of their AOFAS Scores, with a mean change of 32. The functional component of the Score had the largest change from pre- to postoperative
6. Scope assisted repair of syndesmotic instability is helpful

R. Lee et al. (2008)
1. Arthroscopic subtalar release was done in 17 patients with painful subtalar stiffness following an intraarticular calcaneal fracture of Sanders Type II or III
2. Mean duration from injury to arthroscopic release was 11 months and the mean follow-up after release was 17 months
3. 6 patients very satisfied, 8 satisfied, and 3 dissatisfied
4. AOFAS Ankle Hindfoot Score improved from 49 to 80

S. Rammelt et al. (2009)
1. Performed percutaneous reduction and screw fixation in less severe intraarticular calcaneal fractures
2. 61 patients involved with Type II calcaneal fractures; in 33 of 61 patients with displaced intraarticular fractures (Types IIA and IIB), anatomic reduction of the subtalar joint was confirmed arthroscopically
3. AOFAS Score of 92 and Bohler’s angle and calcaneal width were reduced close to values of the uninjured side

T. Bonasia et al. (2011)
1. Excellent review of the role of arthroscopy in the management of fractures about the ankle
2. Discusses indications and contraindications for arthroscopic treatment of ankle fractures.

U. Lui and Chan (2012)
1. Did arthroscopic debridement of 50 patients with late complications of calcaneal fractures
2. Median age was 45 years old with median follow-up of 49 months
3. A variety of procedures were done on the patients, including debridements and fusions
4. AOFAS scores preop = 60.5 and postop = 90

V. Chen et al. (2015)
1. Did systematic review of arthroscopy-assisted surgery for acute ankle fractures
2. Found acute ankle fractures are often seen with multiple soft tissue injuries in which arthroscopy can be helpful for diagnosis and treatment

III. TREATMENT OF ACUTE OSTEOCHONDRLAL FRACTURES OF THE TALUS
A. Introduction
1. Uncommon injury – 8 case reports in the literature
2. Need high index of suspicion to not miss this
3. Time is critical in treatment

B. Mechanism of Injury
   1. Usually associated with inversion injury
   2. More common in younger population
   3. Injury usually occurs with sports

C. Diagnosis
   1. Careful physical examination
   2. Appropriate x-rays
   3. MRI, CT scans
   4. Usually involves lateral talar dome and is inverted

D. Treatment
   1. Arthroscopy and possible open surgery as soon as possible
   2. Excise loose cartilage fragments
   3. Usually large fragment of bone and cartilage loose and upside down in joint
   4. Debride joint
   5. Try to reduce and pin via the arthroscope
   6. Arthroscopic reduction not possible, do open Broström approach and pin fragment with absorbable pins and screws

E. Results
   1. Only reported series by Dunlap, Ferkel and Applegate
   2. 10 patients with lateral inverted osteochondral lesion (“LIFT” lesion); average age = 17
   3. 2 patients excised fragment; 8 reattached fragment and did Broström repair
   4. Average time of follow-up was 112 months (9.3 years)
   5. AOFAS score 19→87; SANE = 82; Modified Weber = 82
   6. 6 good; 3 fair; 1 poor

IV. POST-FRACTURE DEFECTS
A. Indications
   1. Pain
   2. Swelling
   3. Catching
   4. Loss of range of motion
   5. Avascular necrosis
   6. Chondromalacia
   7. Degenerative joint disease

B. Post-fracture Procedures
   1. Lysis of adhesions
   2. Removal of osteophytes
   3. Joint debridement of articular surfaces
   4. Removal of loose bodies
   5. Synovectomy
   6. Arthroscopic ankle arthrodesis

C. Technique for Old Fractures
1. Cut hole in scar and enlarge slowly
2. Go anterior and posterior
3. Avoid injuring neurovascular structures
4. Encourage early range of motion

D. SCOI Results for Old Fractures
1. 25 patients
2. Average age = 33 years
3. Average follow-up = 36 months
4. 23 closed, 2 open
5. 21 ORIF, 4 cast

E. Arthroscopic Findings for Old Fractures
1. Arthrofibrosis = 100%
2. Chondromalacia = 80%
3. Osteochondral lesions of the talus = 19%
4. Loose bodies = 10%
5. Preoperative range of motion arc total = 35°; DF = 8°; PF = 27°
6. Postop range of motion arc total = 50°; DF = 12°; PF = 38°

F. Overall Results for Old Fractures
1. Good = 76%
2. Fair = 8%
3. Poor = 16%

G. Results Influenced By:
1. Age of injury
2. Degree and amount of articular damage
3. Quality of the articular reduction
4. Arthrofibrosis
5. Postoperative complications
   a. Screws penetrate joint
   b. Anterior compartment syndrome after ankle arthroscopy with Maisonneuve fracture

H. van Dijk et al. looked at 34 patients with residual complaints following fracture
1. Group 1 (18) had complaints due to anterior bony or soft tissue impingement
2. Group 2 (16) had more complaints without definite diagnosis
3. After surgery, Group 1 had significant better score for patient satisfaction than Group 2

I. Thomas et al. (2005) looked at chronic pain after ankle fractures arthroscopically
1. 50 patients involved with mean injury to arthroscopy time of 20 months
2. Synovitis was present in all ankles, located anterolaterally in 36
3. Arthrofibrosis found in 20 ankles
4. Chondral damage noted in 45 ankles, 30 in the talus and 15 in the tibia
5. Synovitis and chondral damage more frequent than arthrofibrosis and spurring, primarily in the anterolateral aspect of the joint

V. Pearls for Arthroscopic Ankle Fracture Treatment
A. Use soft tissue distraction gently
B. Establish a separate inflow cannula and wash out the joint completely
   1. Avoid using the fluid pump
C. Use fluoroscopy to verify fracture reduction and hardware position
D. Examine entire joint carefully and treat associated pathology
E. Get out of the dark ages and use new arthroscopic techniques to treat acute and chronic ankle fractures

References


