Financial Disclosures

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I certify that there is no actual or potential conflict of interest in relation to this presentation.
Osteomyelitis of the foot

- NO

- Side Effects:
  - Recurrent ulcer
  - Transfer lesion
  - Deformity
  - Reamputation

- Major Amputation
- Minor Amputation
- Antibiotic Treatment
- Foot Preserving Surgery
Aim of the study

The aim of this prospective study was to evaluate the outcome of limb preserving surgery of osteomyelitis in the foot.
Methods

- **Preoperative Examination:**
  - Ulcer (Wagner Classification)
  - MRI
  - Location of osteomyelitis
  - Underlying deformity
  - Laboratory test: CRP, HBA1c

- **Postoperative Examination:**
  - Complication
  - Pathology
  - Osteomyelitis recurrence
  - Laboratory test: CRP
  - Surgical procedures
    - Number
    - Technique
    - Ulcer
      - Development
      - Recurrency

- **Criteria of inclusion:** Limb preserving surgical procedures
- **Criteria for exclusion:** Primary minor and major amputation

- **42 Patients:**
  - Mean age: 66 years (40-86)
  - Male / Female: 29/13
  - 28 Diabetics (Type 2:26 / Type 1:2)
Methods

• Treatment Algorithm:
  • Initial surgery:
    • Debridement, Jet lavage, Bony resection, Gentamycin inlay,
    • Swab, Bone biopsy

  • Antibiotic treatment
    • Initial: Cefuroxime / Clindamycin i.v.
    • Treatment according to resistance specification
    • Duration: 6 weeks

• Second Surgery
  • Resection arthroplasty
  • Arthrodesis
  • Osteotomy
  • Resection of sesamoids
Results:

Location of osteomyelitis
1. Forefoot: 32
2. Midfoot: 5
3. Hindfoot: 4

Leading Deformity:
1. Forefoot: 22
2. Hindfoot/ Midfoot: 9
3. Other: Forefoot 2 / Hindfoot 4
4. No deformity: 5

Leading Deformity:
- Hammer toe
- Mallet toe D2-5
- Mallet toe D1
- Claw toe
- Hallux valgus
- Hallux valgus interphalangeus
- Hallux rigidus
- Dislocation MTP joint
- Rocker bottom deformity
- Cavus foot
Results: Surgical procedures

1. Follow up: 19.7 months (min: 6 weeks, max: 60 weeks)

2. Number of surgical procedures: mean: 3 (min:1 / max:11)

3. Initial surgical procedure:
   1. Debridment/ antibiotic inlay/ bony resection

4. Final surgical procedure:
   1. Resection arthroplasty: 14
   2. Helal osteotomy: 1
   3. Resection of sesamoid: 1
   4. Debridement: 14
   5. Arthrodesis: 12
      1. Hindfoot: 4
      2. MTP1 joint: 7
      3. Toe: 1
Results: Chemical laboratory diagnosis, Pathology

HBA1C preop.:
- Mean 7.1
- Min.: 5, Max.: 10.8

CRP
- p < 0.05

Pathology:
- 38 chronic osteomyelitis
- 8 acute osteomyelitis

Graphs showing CRP levels preoperatively, 2 weeks postoperatively, and 6 weeks postoperatively.
Results: Complications

1. Osteomyelitis recurrence: 9.5% (4 patients)

2. Complications:
   - Major amputation: 2% (1 patient)
   - Total: 14.2%
     (Sepsis(1), recurrent local infection (2), superficial wound infection (1), pseudarthrosis (1), wound necrosis (2), transtibial amputation (1))

3. Ambulation:
   1. Full weightbearing (insole/custom made shoe) (37)
   2. Partial weightbearing (4)
   3. Orthosis (1)
Results: Foot ulcer

Patients: 42
Foot ulcer preoperative: 26

No ulcer: 16
Grade 1: 4
Grade 2: 14
Grade 3: 8

Foot ulcer postoperative: 4 (15%)

No ulcer: 38
Grade 1: 4
Conclusion

• Limb preserving surgery of osteomyelitis of the foot shows:
  - Limb preservation in 98%
  - In the forefoot resection arthroplasty is the predominant surgical procedure
  - Osteomyelitis recurrence in 9.5%
  - A total complication rate of 14.2%

• Limb preserving surgery of osteomyelitis of the diabetic foot is characterized by
  - Permanent healing of foot ulceration in 85%
References

1. Ha Van G, Diabetes Care 1996; Treatment of osteomyelitis in the diabetic foot. Contribution of conservative surgery; 35 patients with antibiotic treatment/ 32 patients with limited resection of infected MT, phalanx and antibiotic treatment; healing 57% in antibiotic treatment group, 78% healing in surgical group, duration of healing: antibiotic group 462 day, surgical group 181 days

2. Henke PK, Ann Surg. 2005; Review of 518000 patients of the nationwide inpatient sample (NIS): Limb salvage 80%, surgical debridment is associated with increased healing, antibiotic treatment alone is associated with decreased healing, preadmission antibiotic use is associated with greater limb loss

3. Salvana J, Conn Med 2005; Surgical treatment of chronic osteomyelitis in 82 patients (Debridment, closure of dead space, antibiotic treatment, staged bone reconstruction): multiple surgical procedures mean. 2,2, i.v. antibiotics mean 16 d, oral antibiotics mean 59 d, limb salvage in 93%, major amputation 6%, staphylococcus aureus single most common pathogen, 57% polymicrobial infection

4. Dalla Paola L, Foot Ankle Int 2009; Charcot foot with osteomyelitis of the ankle and midfoot, Surgical treatment with external fixation; 45 patients; 86% healing, average time of fixation: 25.7 weeks, 8% major amputation

5. Johnson J.E.; Foot Ankle Int 2010; One stage resection and pin stabilization of the first metatarsophalangeal joint for chronic plantar ulcer with osteomyelitis; 15 patients; Resection MT head, pin fixation for 8 weeks; 14 (95%) ulcers healed, 17% (3 patients) developed recurrent ulcerations

6. Jae Jung Jeong, Foot Ankle Int 2012; Surgical treatment of non diabetic chronic osteomyelitis involving the foot and ankle; Method: Debridment, dead space control, arthrodesis, 15 patients, average number of surgeries: 2 patients (6%) recurrence of osteomyelitis

7. Pandur MS; Foot Ankle Int 2012; Osteomyelitis in Charcot arthropathy: single stage resection of infected bone and deformity correction with ring fixation; 95% limb salvage, amputation 2,1%, complication 6,4%

8. Eyal A., Foot Ankle Int. 2012; Antibiotic impregnated cement spacer for salvage of diabetic osteomyelitis; 23 patients, 21 patients (91,3%) healed, toe amputation in 2 patients (8%)

9. Aragon-Sanchez, Diabetes Med. 2012; Osteomyelitis in 81 diabetic patients, limb preserving surgical treatment in 48 patients (59%), Minor amputation in 32 patients (39%) and major amputation in 1 patient (1,2%): postoperative antibiotic treatment for 36 days, Recurrence of osteomyelitis: 4,6%, 24% revision surgery, 98,8% limb salvage

10. Lazaro Martinez JL, Diabetes Care 2014; Antibiotics versus conservative surgery for treating diabetic foot osteomyelitis; 18 patients (75%) healed in the antibiotic group, 19 patients (86%) healed in the surgical group

11. Moore J., Foot Ankle Int 2015; Results of 2 fusion methods for the treatment of osteomyelitis following fractures about the ankle: 30 patients (19 internal fixation/ 13 external fixator); limb salvage 90%/92%, fusion rate 74%/69%, recurrent infection 21%/15%, major amputation 10, 7%

12. Tamir E., Int J Low Extrem Wounds, 2016; 25 patients with neuropathic toe ulcers and osteomyelitis underwent debridment and antibiotic treatment, 11,5% toe amputation