Ankle arthrodesis vs. Arthroplasty

Ankle Arthrodesis vs. Arthropasty

Hans-Jörg Trnka

Foot and Ankle Center Vienna

September 9th, 2011
Ankle arthrodesis was for many years the gold standard for ankle arthritis
How difficult is a revision of a failed TAA?

“I tell my patients that at some point an oil change will be necessary.”

Jim Nunley
Ankle arthrodesis vs. Arthroplasty

It is not just an oil change
Ankle arthrodesis vs. Arthroplasty

61 year old patient

1 y post OP pain

2 y after first change: pain
Ankle arthrodesis vs. Arthroplasty

Introduction

Pat & Meths

Results

Discussion

Conclusions

Another change and again pain

Next surgery more pain
Introduction

**Ankle arthrodesis vs. Arthroplasty**

Patient now on pain medication
Ankle arthrodesis vs. Arthroplasty

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Femoral head + nail
Ankle arthrodesis vs. Arthroplasty

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271 patients
Av. age 58.4 years
FU 36.1 months (12 – 64)
93 % excellent and good
Comparative Study of the Quality of Life Between Arthrodesis and Total Arthroplasty Substitution of the Ankle

Luis Esparragoza, MD¹, Carlos Vidal, PhD¹, Javier Vaquero, PhD²

The Journal of Foot and Ankle Surgery 50 (2011) 383-387

Prospective comparative study
16 Arthrodesis vs. 14 TAA
AOFAS SCALE
SF-36

„Based on our results........the arthroplasty produces better results than the fusion

Great study?
Ankle arthrodesis vs. Arthroplasty

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Always made a TTC arthrodesis

2 talar necrosis

50% complications

AES prosthesis

Taken from the market

30% complications

Poor study
Ankle arthrodesis vs. Arthroplasty

Our own study:

Aim of this retrospective study was to determine if there is any difference in functional outcome with biomechanically objective assessment tools and participation in sports and recreational activities in patients who underwent ankle arthrodesis and TAA respectively in a single surgeon population.
Ankle arthrodesis vs. Arthroplasty

Indications

- Posttraumatic ankle arthrosis
- Idiopathic ankle arthrosis
- Post septic ankle arthrosis
- Neurological deformity
# Ankle arthrodesis vs. Arthroplasty

## Patients & Methods

<table>
<thead>
<tr>
<th>Arthrodesis</th>
<th>demograhics</th>
<th>TAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>Number of patients</td>
<td>28</td>
</tr>
<tr>
<td>64 ± 10.8 (40 - 84)</td>
<td>Age</td>
<td>56 ± 14.0 (34 - 85)</td>
</tr>
<tr>
<td>169 ± 7.6</td>
<td>Height (cm)</td>
<td>171 ± 9.4</td>
</tr>
<tr>
<td>80.32 ± 10.66</td>
<td>Weight (kg)</td>
<td>80.67 ± 10.84</td>
</tr>
<tr>
<td>10:12</td>
<td>Gender (m:f)</td>
<td>14:14</td>
</tr>
</tbody>
</table>
Ankle arthrodesis vs. Arthroplasty

Postoperative protocol

8 weeks ankle arthrodesis
6 weeks ankle arthroplasty
Ankle arthrodesis vs. Arthroplasty

Investigative tools

- AOFAS Score
- Sports activities
- Radiographic evaluation
- Pedobarography
- Gait analysis
Ankle arthrodesis vs. Arthroplasty

Radiological examination

Radiographs: Foot weightbearing

ap: Ankle
lateral: ankle
Ankle arthrodesis vs. Arthroplasty

At f/u the AOFAS hindfoot score\(^1\), patient’s satisfaction were evaluated.

Additionally, plantar pressure distribution was assessed and patients were asked about their participation in sports and recreational activities before the onset of restricting symptoms and at f/u

Plantar pressure distribution assessment was performed using the emed at platform (Novel GmbH Munich)

Foot was divided into following regions of interest:
- Total object
- Toes 1, 2 and 3 – 5
- Metatarsal heads 1, 2, 3, 4,
- Midfoot
- Hindfoot

and peak pressure as well as contact time have been calculated

\(^1\)Kitaoka et al., Foot Ankle Int. 94
Ankle arthrodesis vs. Arthroplasty

Gait analysis

Measurement of hindfoot angle
Ankle arthrodesis vs. Arthroplasty

RESULTS

<table>
<thead>
<tr>
<th>Arthrodesis demographics</th>
<th>TAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>21/21 Available for the study</td>
<td>21/28</td>
</tr>
<tr>
<td>3 arthrodesis 2 revisions 2 did not show up</td>
<td></td>
</tr>
<tr>
<td>29 ± 22.7 F/u (months)</td>
<td>36 ± 18.8</td>
</tr>
</tbody>
</table>
Ankle arthrodesis vs. Arthroplasty

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Pre op

6 weeks

3 years

After revision
Ankle arthrodesis vs. Arthroplasty

**AOFAS score**

<table>
<thead>
<tr>
<th></th>
<th>Arthrodesen</th>
<th>Prothese</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AOFAS Score</strong></td>
<td>73</td>
<td>78</td>
</tr>
</tbody>
</table>

**Patient satisfaction**

<table>
<thead>
<tr>
<th>Zufriedenheit</th>
<th>Arthrodesen</th>
<th>Prothese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sehr Zufrieden</td>
<td>83,3%</td>
<td>77,3%</td>
</tr>
<tr>
<td>Zufrieden</td>
<td>5,6%</td>
<td>9,1%</td>
</tr>
<tr>
<td>Mäßig Zufrieden</td>
<td>11%</td>
<td>4,5%</td>
</tr>
<tr>
<td>Wenig Zufrieden</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Nicht Zufrieden</td>
<td>0%</td>
<td>4,5%</td>
</tr>
</tbody>
</table>
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September 9th, 2011
Ankle arthrodesis vs. Arthroplasty

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84 AOFAS points
Ankle arthrodesis vs. Arthroplasty
Radiographic evaluation

Tibio-talar angle:

89° (82 – 100)

No pseudarthrosis
Radiographic evaluation

Tibia:
6 cases of loosening lines
3 cases of loose implant

Talus:
1 case of loosening lines
2 cases of loose implant
Ankle arthrodesis vs. Arthroplasty

ROM ankle arthroplasty

Ø: 23° (12 – 47,5)
Ankle arthrodesis vs. Arthroplasty

Post OP

5 y FU
AOFAS 91 points
Ankle arthrodesis vs. Arthroplasty

Sports activities

**Sports before surgery**

- Handball
- Laufen
- Reiten
- Eislaufen
- Gymnastik
- Langlaufen
- Nordic Walking
- Radfahren
- Tanzen
- Schwimmen
- Rudern
- Wandern
- Schifahren
- Fußball
- Tennis

**Sports after surgery**

- Handball
- Laufen
- Reiten
- Eislaufen
- Gymnastik
- Langlaufen
- Nordic Walking
- Radfahren
- Tanzen
- Schwimmen
- Rudern
- Wandern
- Schifahren
- Fußball
- Tennis
Ankle arthrodesis vs. Arthroplasty

Pain

Incidence of pain

Nie  Monatlich  Wöchentlich  Täglich  Immer

0 10 20 30 40 50

P rothese  Arthrodes e

3rd Foot and Ankle Symposium
Arthritic Disorders of the Foot and Ankle
Diagnosis and Management

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Ankle arthrodesis vs. Arthroplasty

Pre OP

6 weeks

5 y FU

AOFAS: 78 points
Ankle arthrodesis vs. Arthroplasty

What is the evidence in the literature?
Ankle arthrodesis vs. Arthroplasty

Introduction

Pat & Meths

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Advantage Endosprosthesis

Mobility (ROM maintained)
Avoid der Subtalar und Talonavic. arthrosis

Jung HG, Parks BG, Nguyen A, Schon LC.: Effect of tibiotalar joint arthrodesis on adjacent tarsal joint pressure in a cadaver model. Foot Ankle Int. 28/1: 2007

Significant pressure after ankle fusion in the talonavicular and subtalar joint

Short Rehabilitation
Evolution of surgery
Ankle arthrodesis vs. Arthroplasty

Arthrodesis

Ankle arthrodesis and its relationship to ipsilateral arthritis of the hind- and mid-foot


70 Patientes / 71 Arthrodeses
All had adjacent arthroses

The presence of such changes may not be a consequence of this arthrodesis.
Ankle arthrodesis vs. Arthroplasty

Coester C., Salzman et al.: Longterm Results of ankle arthrodeses for posttraumatic DJD. JBJS A -2001

23 patients, 22 y FU,
6/23 in correct position
Adjacent arthrosis in all cases
Ankle arthrodesis vs. Arthroplasty

Results Transferarthrosis revision rate

SooHoo N.F., Zingmond D.S., Ko C.Y.: Comparison of reoperation rates following ankle arthrodoses and total ankle arthroplasty. JBJS 89(10): 2007

Revision rate:
4705 Arthrodesis vs. zu 480 OSG endoprosthesis:

1 year: 5:11%
5 year: 9:23%
Risk: 1,5 : 2,49
Ankle arthrodesis vs. Arthroplasty

Intermediate and Long-Term Outcomes of Total Ankle Arthroplasty and Ankle Arthrodesis

A Systematic Review of the Literature

By S.L. Haddad, MD, J.C. Coetzee, MD, R. Estok, RN, BSN, K. Fahrbach, PhD, D. Banel, BA, and L. Nalyshyk, MD, MPH

Investigation performed at Illinois Bone and Joint Institute, Glenview, Illinois, and United BioSource Corporation, Medford, Massachusetts

THE JOURNAL OF BONE & JOINT SURGERY • JBJS.ORG
Volume 89-A • Number 9 • September 2007

<table>
<thead>
<tr>
<th>49 Studien aus 460 Publik. (Meta Analyse - Confidence Interval)</th>
<th>Arthrodese (n=1262)</th>
<th>Prothese (n=852)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOFAS</td>
<td>75,6</td>
<td>78,2</td>
</tr>
<tr>
<td>Excellent/good</td>
<td>31%/37%=68%</td>
<td>38%/30,5%=68,5%</td>
</tr>
<tr>
<td>Fair/poor</td>
<td>13%/13%=26%</td>
<td>5,5%/24%=29,5%</td>
</tr>
<tr>
<td>5/10Jahre Survival</td>
<td>100%</td>
<td>78%/77%</td>
</tr>
<tr>
<td>Revision</td>
<td>9% (Pseudoarthr.)</td>
<td>7% (Lockerung/Migration)</td>
</tr>
<tr>
<td>BKA</td>
<td>5%</td>
<td>1%</td>
</tr>
</tbody>
</table>
Ankle arthrodesis vs. Arthroplasty

Complications and Failure After Total Ankle Arthroplasty

28% Revisions
11% Total Failures (8 Amputations, 25 arthrodeses)

Total Ankle Arthroplasty With the Agility Prosthesis:
Clinical and Radiographic Evaluation
Kopp FJ, Mihir MP, Deland JT
Foot & Ankle Int., Vol. 27, No. 2, 2006

39% revisions
97% Survival rate ????????????????

85% loosening zones
Ankle arthrodesis vs. Arthroplasty

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24% Revisionrate

14% looseing rate

12% not satisfied

24% painfree
Ankle arthrodesis vs. Arthroplasty

Ankle fusion results

<table>
<thead>
<tr>
<th>AUTOREN</th>
<th>JAHR</th>
<th>N</th>
<th>Pseudarthr. Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morgan et al</td>
<td>1985</td>
<td>101</td>
<td>5(5%)</td>
</tr>
<tr>
<td>Frey et al</td>
<td>1994</td>
<td></td>
<td>41%</td>
</tr>
<tr>
<td>Chen et al</td>
<td>1996</td>
<td>42</td>
<td>1(2,5%)</td>
</tr>
<tr>
<td>Flamme et al</td>
<td>1997</td>
<td>25</td>
<td>5(20%)</td>
</tr>
<tr>
<td>Kitaoka et al</td>
<td>1998</td>
<td>19</td>
<td>3(16%)</td>
</tr>
<tr>
<td>Rowan et Davey</td>
<td>1998</td>
<td>33</td>
<td>2(6,7%)</td>
</tr>
<tr>
<td>Mann et al</td>
<td>1998</td>
<td>81</td>
<td>10(12%)</td>
</tr>
<tr>
<td>O’Brien et al</td>
<td>1999</td>
<td>17</td>
<td>3(18%)</td>
</tr>
<tr>
<td>Taylor et al</td>
<td>1999</td>
<td>18</td>
<td>2(12%)</td>
</tr>
<tr>
<td>Anderson et al</td>
<td>2002</td>
<td>29</td>
<td>3(11%)</td>
</tr>
<tr>
<td>Muckley et al</td>
<td>2003</td>
<td>110</td>
<td>11(10%)</td>
</tr>
<tr>
<td>Fuchs et al</td>
<td>2003</td>
<td>18</td>
<td>1(6%)</td>
</tr>
<tr>
<td>Trieb et al</td>
<td>2004</td>
<td>34</td>
<td>4(11,7%)</td>
</tr>
<tr>
<td>Thomas et al</td>
<td>2006</td>
<td>26</td>
<td>0(0%)</td>
</tr>
<tr>
<td>Schuh et al</td>
<td>2011</td>
<td>20</td>
<td>0(0%)</td>
</tr>
</tbody>
</table>
## Fusionsrate

<table>
<thead>
<tr>
<th></th>
<th>PTS.</th>
<th>TIME</th>
<th>FUSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann (open)</td>
<td>81</td>
<td>13.8 wks</td>
<td>88%</td>
</tr>
<tr>
<td>Scranton (open)</td>
<td>25</td>
<td>12.0 wks</td>
<td>100%</td>
</tr>
<tr>
<td>Myerson (open)</td>
<td>16</td>
<td>14.5 wks</td>
<td>100%</td>
</tr>
<tr>
<td>Mann (scope)</td>
<td>78</td>
<td>8.0 wks</td>
<td>91%</td>
</tr>
<tr>
<td>Crosby (scope)</td>
<td>42</td>
<td>5.5 mo</td>
<td>74%</td>
</tr>
</tbody>
</table>
Ankle arthrodesis vs. Arthroplasty

50 years FU
Despite more costly implants and longer FU, TAA remains a cost effective alternative to anklefusison in a 60 year old cohort.
Ankle arthrodesis vs. Arthroplasty

Preference-Based Quality of Life of End-Stage Ankle Arthritis Treated with Arthroplasty or Arthrodesis

Gerard P. Slobogean, MD, MPH; Alastair Younger, MD, FRCSC; Kelly L. Aposile, MD; Carlo A. Marra, PharmD, PhD; Kevin Wing, MD, FRCSC; Murray Parmer, MD, FRCSC; Tim Daniels, MD, FRCSC; Mark Glazebrook, PhD, MD, FRCSC

Table 2: Mean Health State Values, SF-6D (95% CI)

<table>
<thead>
<tr>
<th></th>
<th>TAA</th>
<th>AA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>0.67 (0.64–0.69)</td>
<td>0.66 (0.63–0.68)</td>
</tr>
<tr>
<td>1 year</td>
<td>0.73 (0.71–0.76)</td>
<td>0.73 (0.70–0.76)</td>
</tr>
</tbody>
</table>

TAA, Total ankle arthroplasty; AA, Ankle arthrodesis.

At 1 year no difference in Quality of Life
Ankle arthrodesis vs. Arthroplasty

Atomic bomb?
Ankle arthrodesis vs. Arthroplasty

FAILURES?????

EASY TO HANDLE`???????
Ankle arthrodesis vs. Arthroplasty

Post OP picture in cast
„OK“
Nach 4 Wochen doch Revision mit Zement
Post OP Bild im Gips
Ankle arthrodesis vs. Arthroplasty

Nach 4 Wochen
Explantation und Gips
Ankle arthrodesis vs. Arthroplasty

Weitere 4 Wochen „wir sollten doch versteifen“

Oh es gibt 2 Ebenen im RÖ
Ankle arthrodesis vs. Arthroplasty

Noch ein Versuch

Vielleicht nur Gips???
Ankle arthrodesis vs. Arthroplasty
Ankle arthrodesis vs. Arthroplasty

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Fibulainterponat, Hüftkopf, winkelstabile Verplattung
Ankle arthrodesis vs. Arthroplasty

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Pre op

3 y FU

After revision
Ankle arthrodesis vs. Arthroplasty

Prospective Study of a Cementless, Mobile-Bearing, Third Generation Total Ankle Prosthesis

Katja Schenk, MD; Sebastian Lieske, MD; Michael John, MD; Konrad Franke, MD; Stéphane Moulry, MD, PhD; Emmanuel Lizee3; Wolfram Neumann, MD

Magdeburg, Germany; Paris, France; Montbonnot, France

5 years survival curve (Kaplan Meier): Cohort with at least 24 months of FU
Failure = arthrodesis or implant component exchange
Follow-up, n = 218
Mean follow-up = 42.34 mois

Cumulative survival rate (%)

Time since surgery (in months)
Ankle arthrodesis vs. Arthroplasty

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63 years old

3 y FU

AOFAS 90 points
Ankle arthrodesis vs. Arthroplasty

“Publications by some research groups particularly by implant inventors Show deviation from the published outcome by others users and the registry data.“
Conclusion

- Comparison of the clinical results
  
  Higher complication rate with the arthroplasty
  
  Higher patient satisfaction and AOFAS with arthrodesis

- Pedobarography
  
  No significant difference

- Sports activities
  
  More sports with the arthroplasty
Ankle arthrodesis vs. Arthroplasty

Conclusion

A well functioning arthroplasty is better than a well functioning arthrodesis

Select your patients well if you are in doubt, fuse it
Ankle arthrodesis vs. Arthroplasty

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Thank you...
Ankle arthrodesis vs. Arthroplasty

Patient: B.G. 60a
OSG Arthrodesis left

Patient very satisfied

AOFAS - Score 84
Ankle arthrodesis vs. Arthroplasty

Arthrodesese

For heavy working safety is important
This is a farmer