



# Ankle arthrodesis vs. Arthroplasty

## Ankle Arthrodesis vs. Arthroplasty

Hans-Jörg Trnka

Foot and Ankle Center Vienna



September 9th, 2011



# Ankle arthrodesis vs. Arthroplasty



► Introduction

Pat & Meths

Results

Discussion

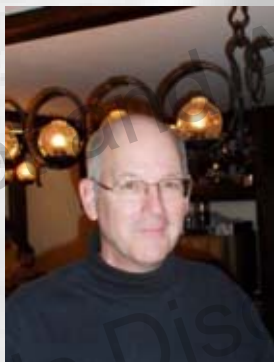
Conclusions

Ankle arthrodesis was for many years the gold standard for ankle arthritis



# Ankle arthrodesis vs. Arthroplasty

**How difficult is a revision of a failed TAA?**



Jim Nunley



**„I tell my patients that at some point  
an oil change will be necessary“**

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# Ankle arthrodesis vs. Arthroplasty

**It is not just an oil change**



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# Ankle arthrodesis vs. Arthroplasty

**61 year old patient**



1 y post OP pain

2 y after first change: pain

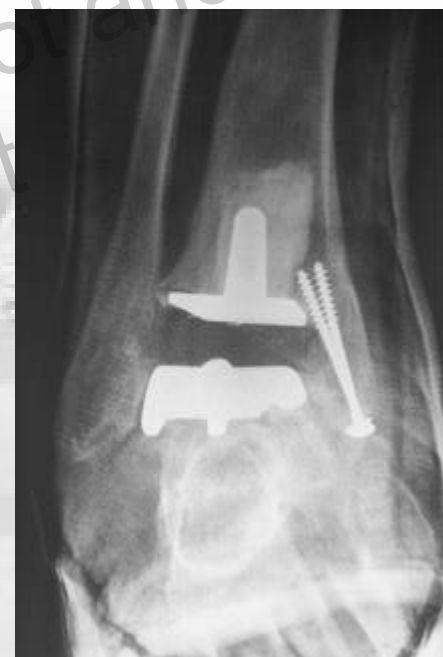
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# Ankle arthrodesis vs. Arthroplasty



Another change and again

Next surgery more pain

pain

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# Ankle arthrodesis vs. Arthroplasty

3<sup>rd</sup> Foot and Ankle Symposium  
Arthritic Disorders of the Foot and Ankle  
Diagnosis and Management



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Einleitung

OSG

Hohlfuß

Plattfuß

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Charcotfuß  
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Revisionen

Discussion

Conclusions



Patient now on pain medication



# Ankle arthrodesis vs. Arthroplasty



Femoral head +  
nail



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# Ankle arthrodesis vs. Arthroplasty

Orthopädie 2006 · 35:533–545  
DOI 10.1007/s00132-006-0941-y  
Online publiziert: 6. April 2006  
© Springer Medizin Verlag 2006

B. Hintermann · V. Valderrabano · M. Knupp · M. Horisberger  
Orthopädische Universitätsklinik, Universitätsspital Basel, Basel

## Die HINTEGRA- Sprunggelenkprothese

Kurz- und mittelfristige Erfahrungen

### ► Introduction

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**271 patients**

**Av. age 58,4 years**

**FU 36,1 months (12 – 64)**

**93 % excellent and good**



# Ankle arthrodesis vs. Arthroplasty



ELSEVIER

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: [www.jfas.org](http://www.jfas.org)

Comparative Study of the Quality of Life Between Arthrodesis  
and Total Arthroplasty Substitution of the Ankle

Luis Esparragoza, MD<sup>1</sup>, Carlos Vidal, PhD<sup>1</sup>, Javier Vaquero, PhD<sup>2</sup>

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?

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# Ankle arthrodesis vs. Arthroplasty



Always made a TTC arthrodesis

2 talar necrosis

50% complications



AES prosthesis

Taken from the market

30% complications

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# Poor study

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## 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.**

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# Ankle arthrodesis vs. Arthroplasty

## Indications

Posttraumatic ankle arthrosis

Idiopathic ankle arthrosis

Post septic ankle arthrosis

Neurological deformity



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# Ankle arthrodesis vs. Arthroplasty

## Patients & Methods



Arthrodesis	demographics	TAR
21	Number of patients	28
64 ± 10.8 (40 - 84)	Age	56 ± 14.0 (34 - 85)
169 ± 7.6	Height (cm)	171 ± 9.4
80.32 ± 10.66	Weight (kg)	80.67 ± 10.84
10:12	Gender (m:f)	14:14



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## Postoperative protocol

8 weeks ankle arthrodesis  
6 weeks ankle arthroplasty



Introduction

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# Ankle arthrodesis vs. Arthroplasty

## Investigative tools

- AOFAS Score
- Sports activities
- Radiographic evaluation
- Pedobarography
- Gait analysis

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# Ankle arthrodesis vs. Arthroplasty

## Radiological examination

Radiographs: Foot weightbearing

ap:  
Ankle

lateral:  
ankle



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## Ankle arthrodesis vs. Arthroplasty

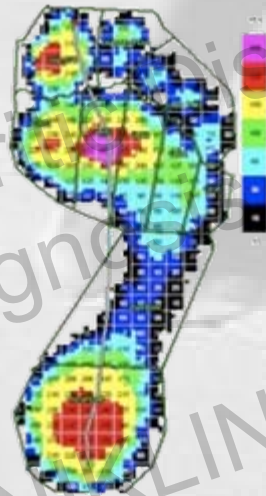
At f/u the AOFAS hindfoot score<sup>1</sup>, patient's satisfaction were evaluated.

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

<sup>1</sup>Kitaoka et al., Foot Ankle Int. 94

### Introduction

### ► Pat & Meths

### Results

### Discussion

### Conclusions



## Gait analysis



Measurement of hindfoot angle

Introduction

► Pat & Meths

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# Ankle arthrodesis vs. Arthroplasty

## RESULTS



Arthrodesis	demographics	TAR
21/21	Available for the study	21/28
	Lost patient	3 arthrodesis 2 revisions 2 did not show up
29 ± 22.7	F/u (months)	36 ± 18.8



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# Ankle arthrodesis vs. Arthroplasty



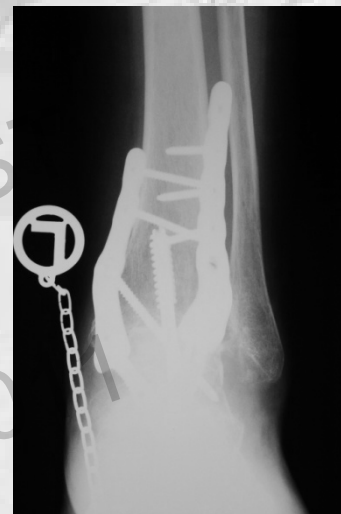
Pre op



6 weeks



3 years



After revision

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Pat & Meths

Results

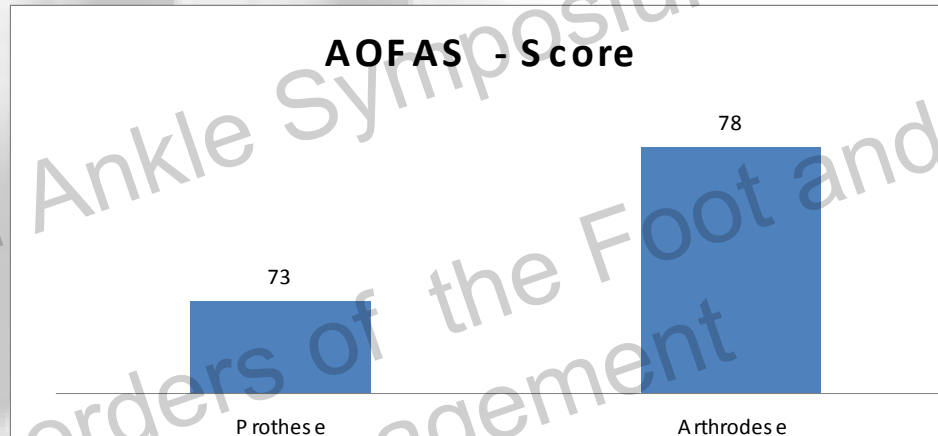
Discussion

Conclusions

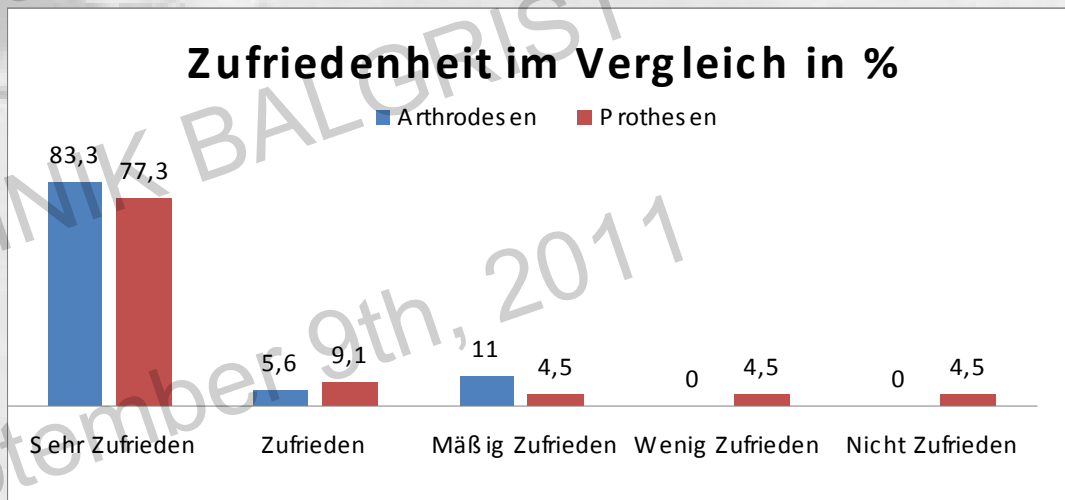


# Ankle arthrodesis vs. Arthroplasty

## AOFAAS score



## Patient satisfaction



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# Ankle arthrodesis vs. Arthroplasty



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84 AOFAS points



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# Ankle arthrodesis vs. Arthroplasty

## Radiographic evaluation



Tibio-talar angle:

89° (82 – 100)

**No** pseudarthrosis

Introduction

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# Ankle arthrodesis vs. Arthroplasty

## Radiographic evaluation

### Tibia:

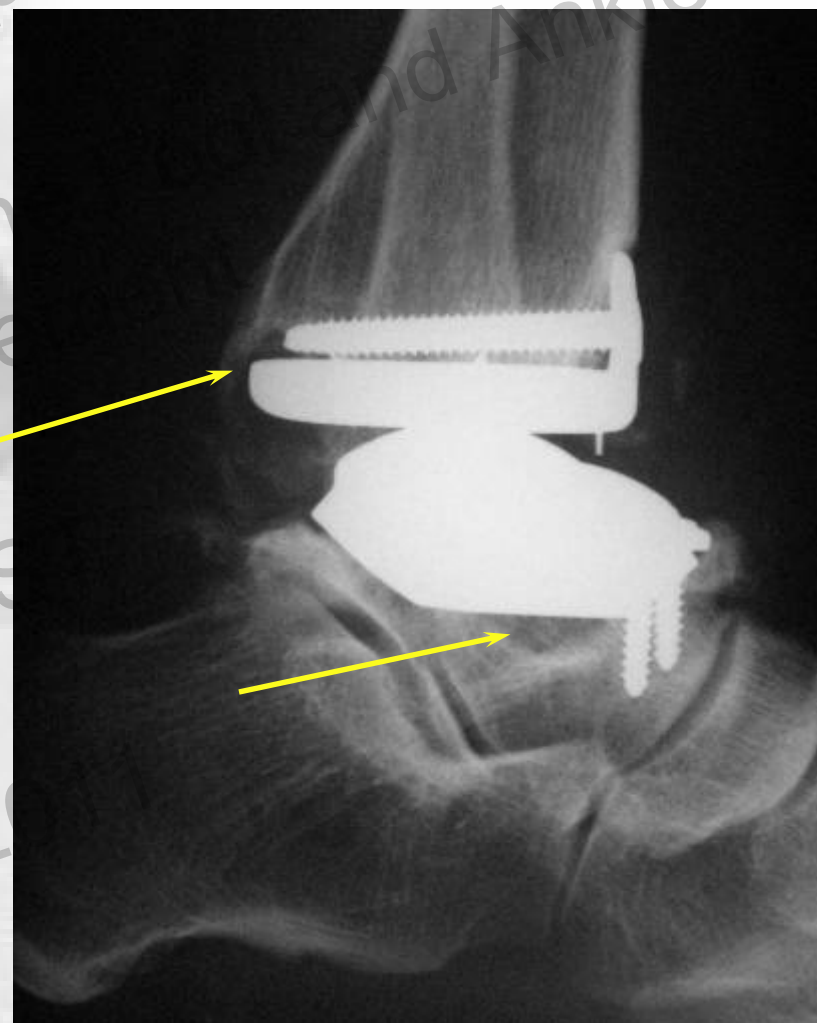
6 cases of loosening lines

3 cases of loose implant

### Talus:

1 case of loosening lines

2 cases of loose implant



Introduction

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# Ankle arthrodesis vs. Arthroplasty

## ROM ankle arthroplasty



Ø: 23° (12 – 47,5)

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Post OP



5 y FU  
AOFAS 91 points

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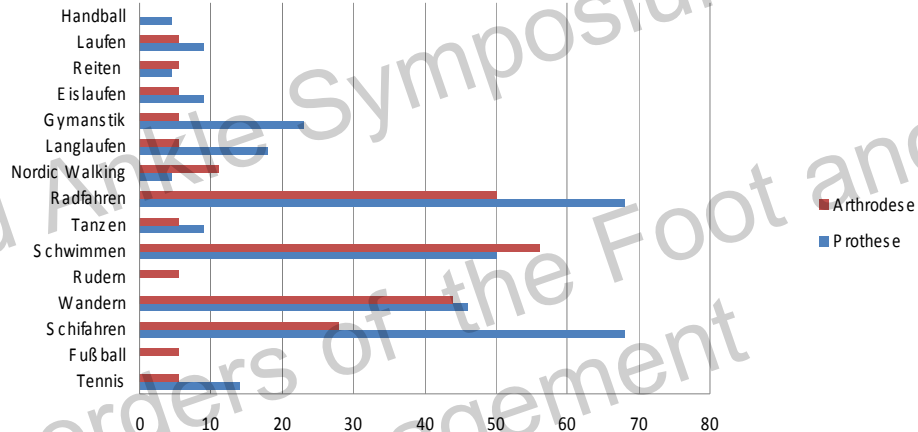
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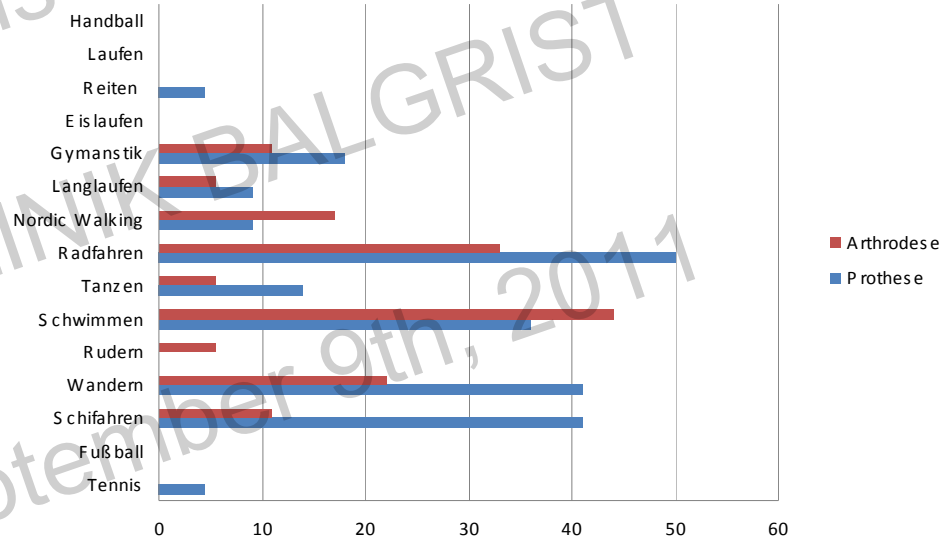
# Ankle arthrodesis vs. Arthroplasty

## Sports activities

Sports before surgery



Sports after surgery



Introduction

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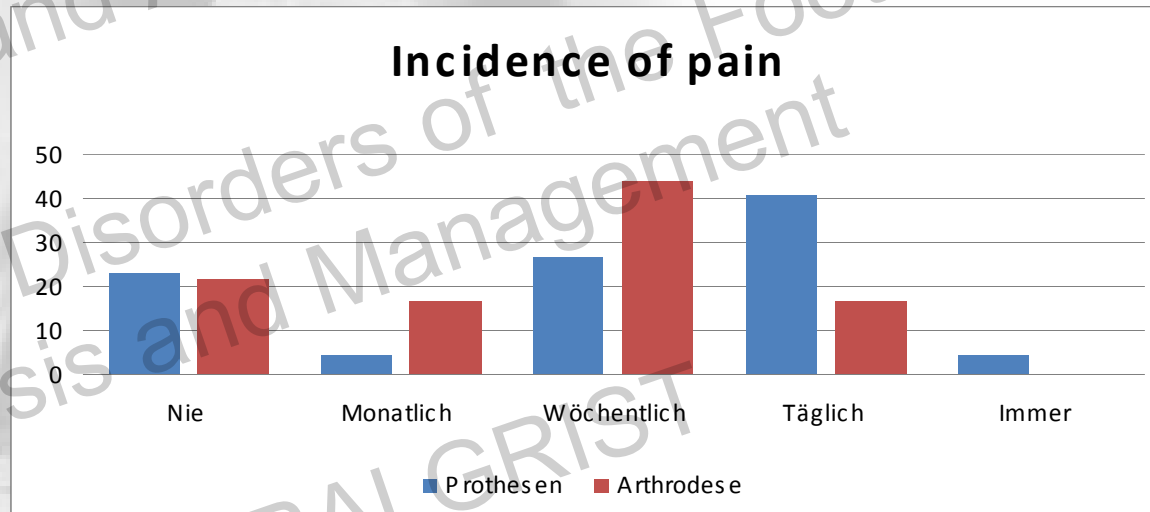
Conclusions





# Ankle arthrodesis vs. Arthroplasty

## Pain



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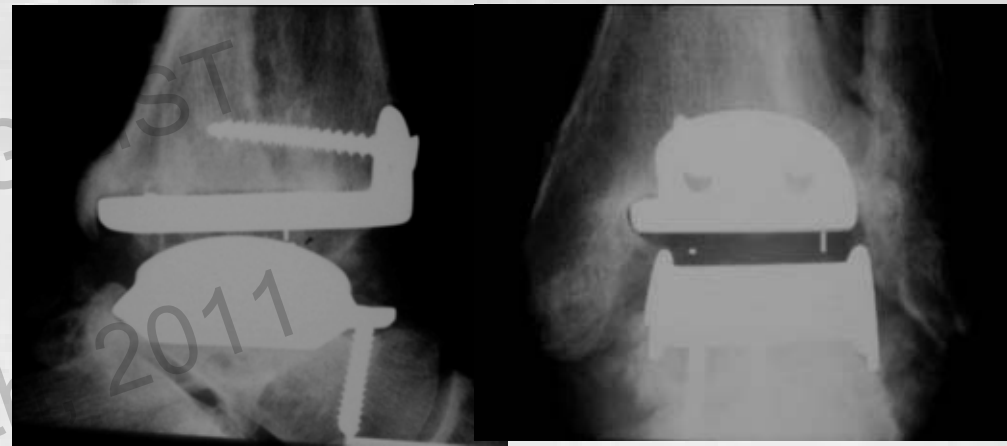
# Ankle arthrodesis vs. Arthroplasty



Pre OP



6 weeks



5 y FU

AOFAAS: 78 points

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## What is the evidence in the literature?

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## Advantage Endoprosthesis

**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**

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## Arthrodesis

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

B. D. Sheridan, BSc(Hons), et al. and I. G. Winson, MBChB, FRCS,  
Journal of Bone and Joint Surgery - British Volume, Vol 88-B, Issue  
2, 206-207.

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**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**

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## Results Transferarthrosis revision rate

*SooHoo N.F., Zingmond D.S., Ko C.Y.: Comparison of reoperation rates following ankle arthrodeses 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**

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# 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. Nalysnyk, 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

#### Introduction

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49 Studien aus 460 Publik. (Meta Analyse - Confidence Interval)	Arthrodesis	Prothese
	39 (n=1262)	10 (n=852)
AOFAS	75,6	78,2
Excellent/good	31%/37%=68%	38%/30,5%=68,5%
Fair/poor	13%/13%=26%	5,5%/24%=29,5%
5/10 Jahre Survival	100%	78%/77%
Revision	9% (Pseudoarthr.)	7% (Lockerung/Migration)
BKA -	5%	1%

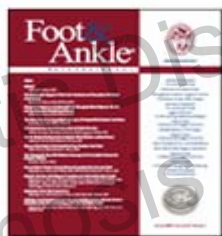


*The Journal of Bone and Joint Surgery (American)* 86:1172-1178 (2004)  
© 2004 [The Journal of Bone and Joint Surgery, Inc.](http://www.thejournalofboneandjoint.com)

## 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**

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Conclusions





# Ankle arthrodesis vs. Arthroplasty

*The Journal of Bone and Joint Surgery (American)* 85:1321-1329 (2003)

© 2003 [The Journal of Bone and Joint Surgery, Inc.](#)

## Uncemented STAR Total Ankle Prostheses

### Three to Eight-Year Follow-up of Fifty-one Consecutive Ankles

Thomas Anderson, MD, Fredrik Montgomery, MD, PhD and Åke Carlsson, MD, PhD

Introduction

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Conclusions

**24% Revisionrate**

**14% looseing rate**

**12% not satisfied**

**24% painfree**





# Ankle arthrodesis vs. Arthroplasty

## Ankle fusion results

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

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# Fusionsrate

	<b>PTS.</b>	<b>TIME</b>	<b>FUSION</b>
<b>Mann (open)</b>	<b>81</b>	<b>13.8 wks</b>	<b>88%</b>
<b>Scranton (open)</b>	<b>25</b>	<b>12.0 wks</b>	<b>100%</b>
<b>Myerson (open)</b>	<b>16</b>	<b>14.5 wks</b>	<b>100%</b>
<b>Mann (scope)</b>	<b>78</b>	<b>8.0 wks</b>	<b>91%</b>
<b>Crosby (scope)</b>	<b>42</b>	<b>5.5 mo</b>	<b>74%</b>

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# Ankle arthrodesis vs. Arthroplasty

## 50 years FU



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Clin Orthop Relat Res (2011) 469:1721–1727

DOI 10.1007/s11999-011-1848-4

## CLINICAL RESEARCH

## Is Total Ankle Arthroplasty A Cost-effective Alternative to Ankle Fusion?

Xan F. Courville MD, MS, Paul J. Hecht MD,  
Anna N. A. Tosteson ScD

**Table 4.** Results of cost-effectiveness analysis

Procedure	Average cost	Incremental cost (\$)	Average utility gained (QALY)	Incremental effectiveness (QALY)	ICER (\$/QALY)
Ankle fusion	\$7900		12.7		
TAA	\$28,000	\$20,200	14.4	1.70	\$11,800

TAA = total ankle arthroplasty; QALY = quality adjusted life-years; \$ = US dollars.

Incremental cost = increased cost of TAA over ankle fusion; Incremental effectiveness = increased utility of TAA over ankle fusion; ICER = incremental cost-effectiveness ratio.

Despite more costly implants and longer FU, TAA remains a cost effective alternative to anklefusion in a 60 year old cohort



FOOT &amp; ANKLE INTERNATIONAL

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DOI: 10.3113/FAI.2010.0563

## 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. Apostle, MD; Carlo A. Marra, PharmD, PhD;  
Kevin Wing, MD, FRCSC; Murray Penner, MD, FRCSC; Tim Daniels, MD, FRCSC; Mark Glazebrook, PhD, MD, FRCSC

Vancouver, Canada

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

	TAA	AA
Baseline	0.67 (0.64–0.69)	0.66 (0.63–0.68)
1 year	0.73 (0.71–0.76)	0.73 (0.70–0.76)

TAA, Total ankle arthroplasty; AA, Ankle arthrodesis.

**At 1 year no difference in Quality of Life**

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Pat &amp; Meths

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# Ankle arthrodesis vs. Arthroplasty

## Atomic bomb?



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# Ankle arthrodesis vs. Arthroplasty

**FAILURES?????**

**EASY TO HANDLE`???????**

- Introduction
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# Ankle arthrodesis vs. Arthroplasty



Post OP picture in cast

„OK“

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# Ankle arthrodesis vs. Arthroplasty



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

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Einleitung

OSG

Hohlfuß

Plattfuß

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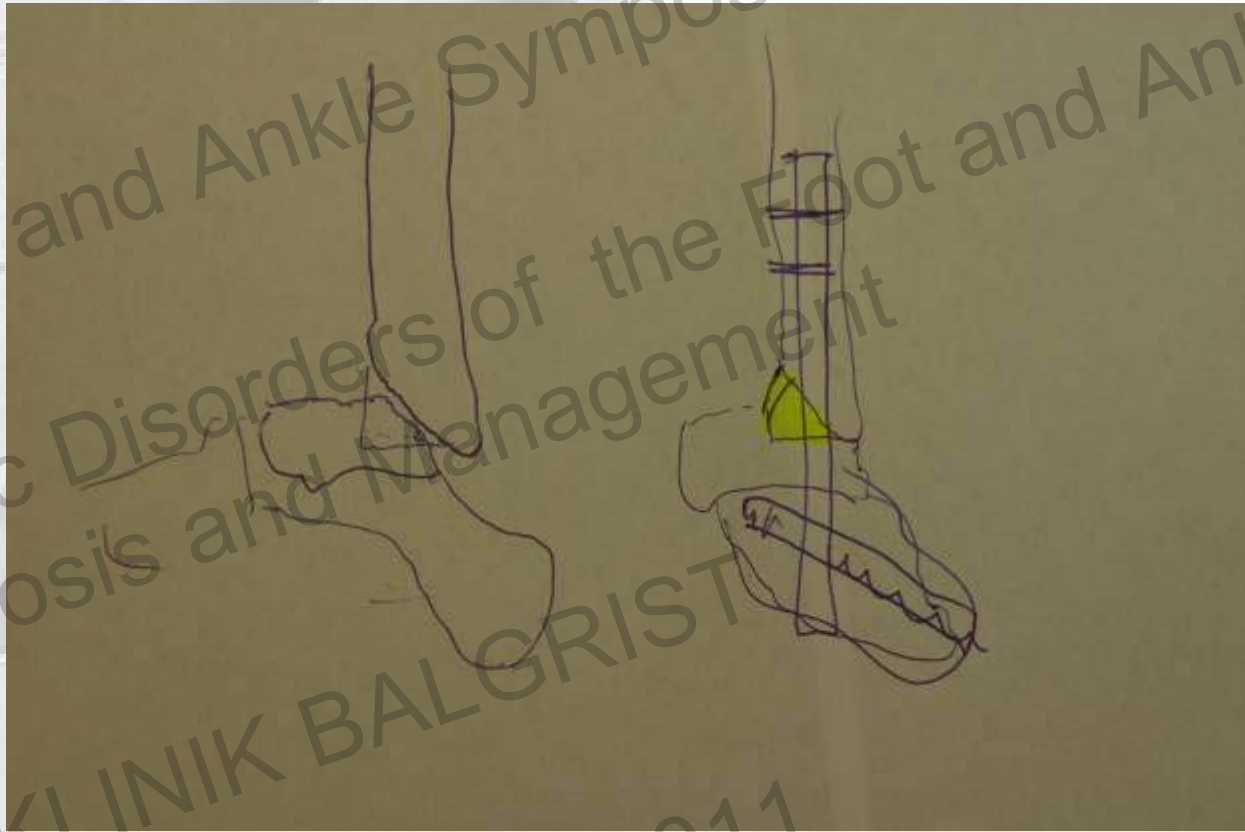


Noch ein Versuch

Vielleicht nur Gips???



- Introduction
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# Ankle arthrodesis vs. Arthroplasty



Fibulainterponat, Hüftkopf, winkelstabile Verplattung

- Einleitung
- OSG
- Hohlfuß
- Plattfuß
- Introduction
- Charcotfuß
- Pat & Meths
- Results**
- Revisionen**
- Discussion
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# Ankle arthrodesis vs. Arthroplasty

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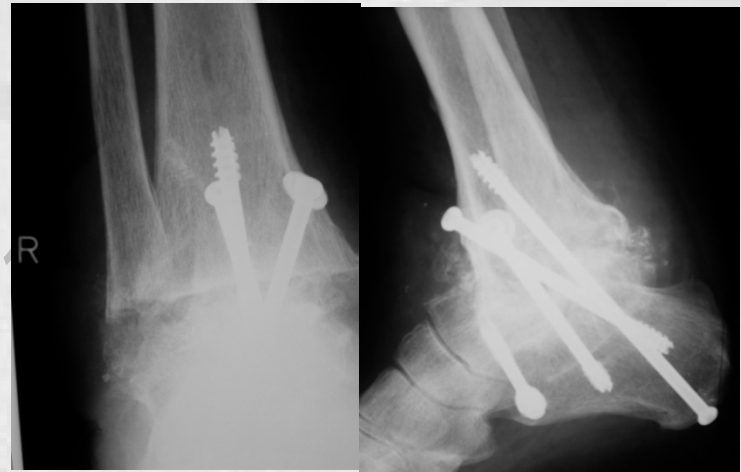
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Pre op



3 y FU



After revision

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# Ankle arthrodesis vs. Arthroplasty

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DOI: 10.3113/FAL.2011.0755

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

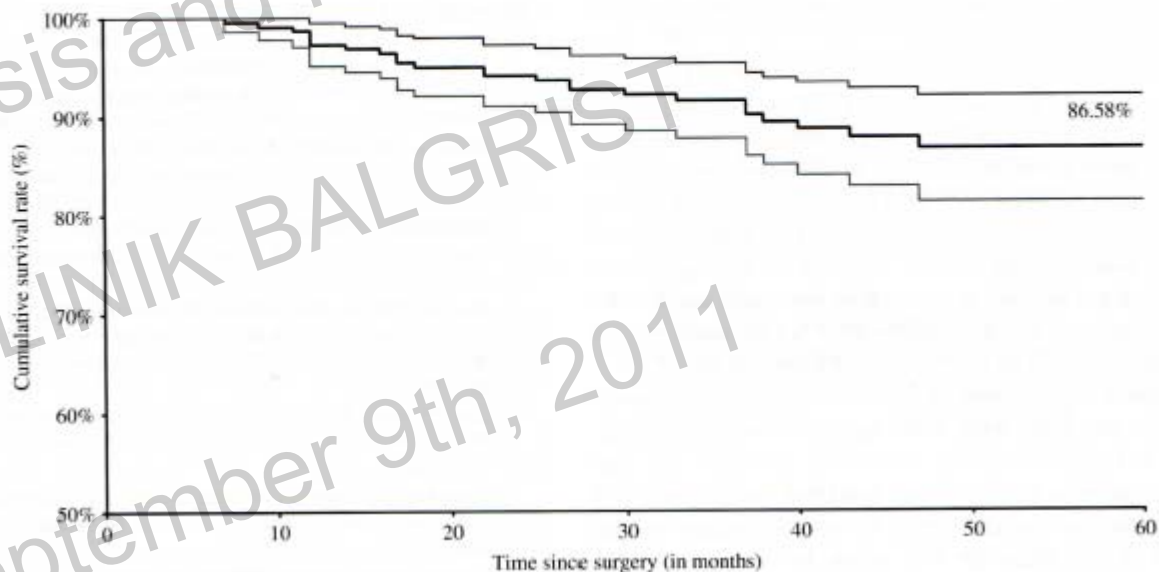
Katja Schenk, MD<sup>1</sup>; Sebastian Lieske, MD<sup>1</sup>; Michael John, MD<sup>1</sup>; Konrad Franke, MD<sup>1</sup>; Stéphane Mouly, MD, PhD<sup>2</sup>; Emmanuel Lizee<sup>3</sup>; Wolfram Neumann, MD<sup>1</sup>

*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

Followup, *n* = 218

Mean followup = 42.34 mois



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# Ankle arthrodesis vs. Arthroplasty



63 years old



3 y FU

AOFAAS 90 points

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DOI: 10.3113/FAL.2011.0740

## Revision Rates After Total Ankle Arthroplasty in Sample-Based Clinical Studies and National Registries

Gerold Labeck, MD<sup>1,2</sup>; Hermann Klaus, MD<sup>2</sup>; Rainer Schlichtherle, MD<sup>1</sup>; Alexandra Williams, MD<sup>1</sup>; Mark Agreiter, MD<sup>1</sup>  
*Innsbruck, Austria; Wangen, Germany*

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„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

Introduction

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## Conclusion

**A well functioning arthroplasty is better than a well functioning arthrodesis**

**Select your patients well  
if you are in doubt, fuse it**

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Foot, September 9<sup>th</sup>, 2011



Thank you...



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# Ankle arthrodesis vs. Arthroplasty

Patient : B.G. 60a

OSG Arthrodesis left



Patient very satisfied



**AOFAS - Score 84**

Introduction

Pat & Meths

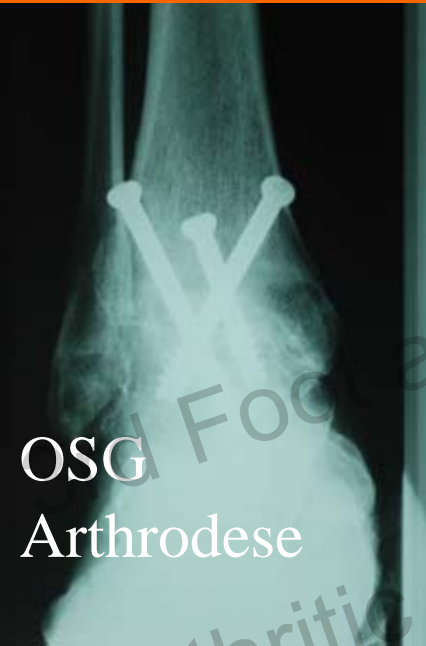
Results

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# Ankle arthrodesis vs. Arthroplasty

## Arthrodesese



For heavy working safety is important  
This is a farmer