

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



1st Metatarsophalangeal fusion

Hans-Jörg Trnka

Foot and Ankle Center Vienna

MTP fusion

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Eduard Albert:

1877 fusion of the knee joint

**The first description of a MTP 1 fusion was
by Broca in 1852.**

Clutton H.H.:

**1894 mtp-I-arthrodesis
for severe hv deformity**



**ivory peg
for internal
fixation**

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Indication

Hallux rigidus

Hallux valgus and rigidus

Hallux valgus and neuromuscular disease

Severe Hallux valgus

Hallux valgus and PcP

Revision surgery

Hallux valgus and Hallux rigidus

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Hallux rigidus



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Hallux valgus neuromuscular disease



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Severe Hallux valgus



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Hallux valgus and RA



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Revision surgery



Technique

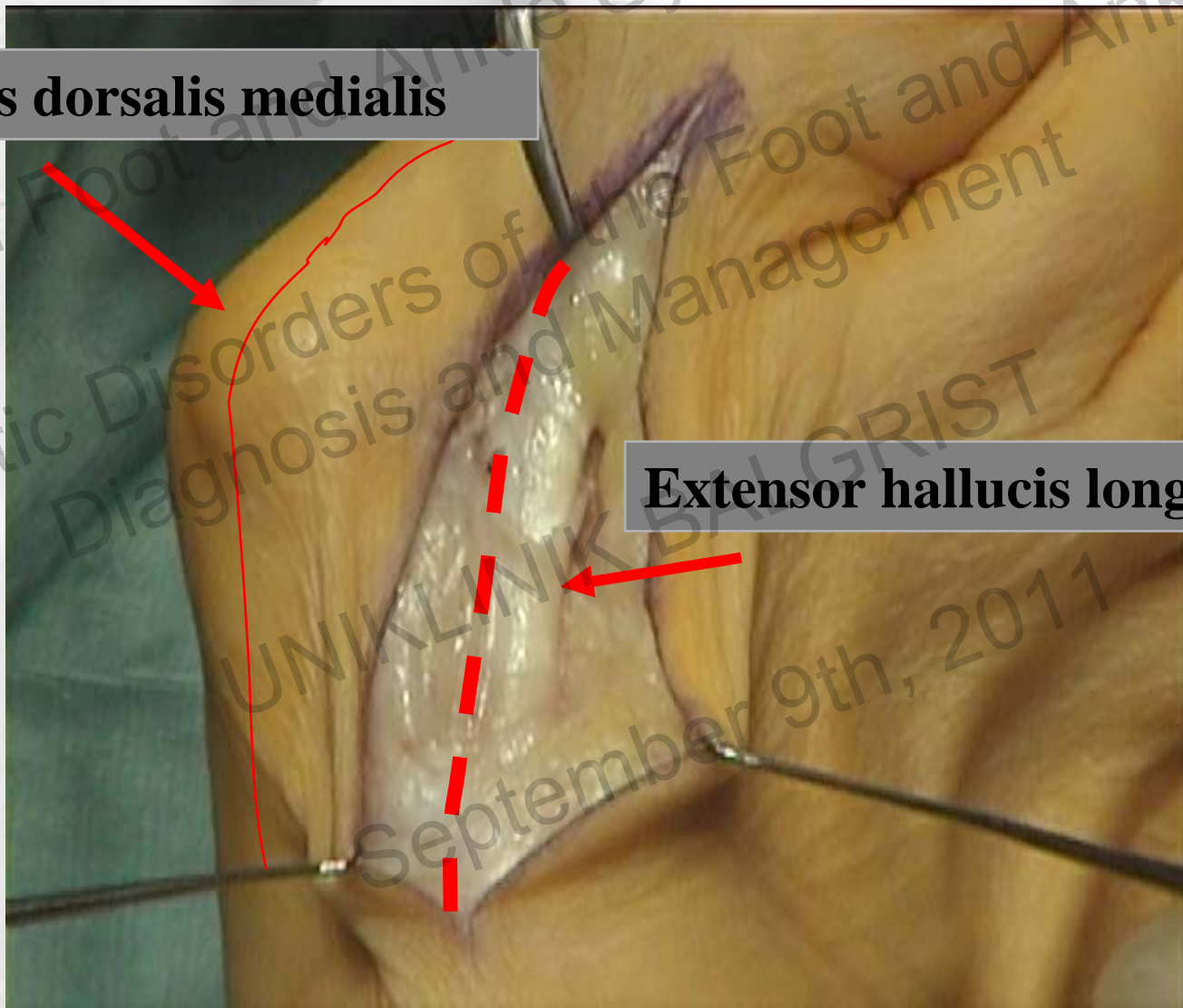
Dorsal incision





Structures to protect

N. cutaneus dorsalis medialis



Extensor hallucis longus

Exposure of the joint

Sufficient exposure
necessary



Joint preparation with special reamers

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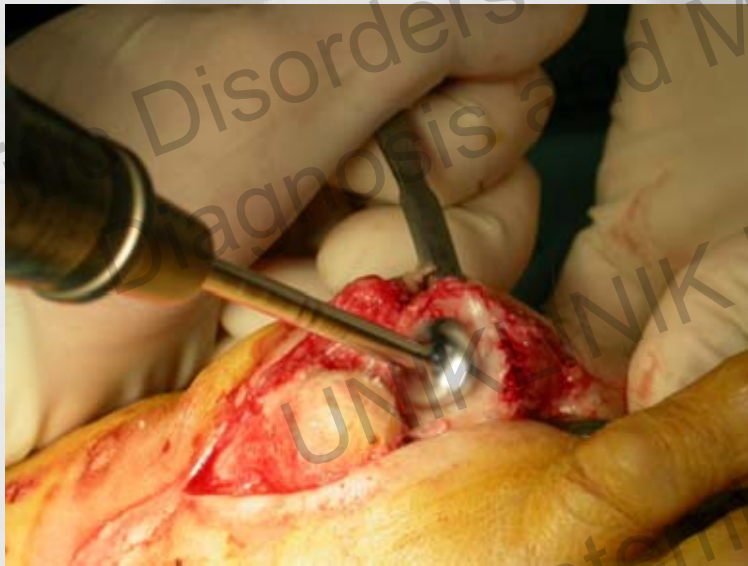
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Special reamers: Base of the phalanx



Position

- 25° -30 ° Dorsalflexion in relation to metatarsal
= 10 – 15 ° to ground surface**
- 15° to 20° valgus**
- Neutral rotation**

Always use of fluoroscope



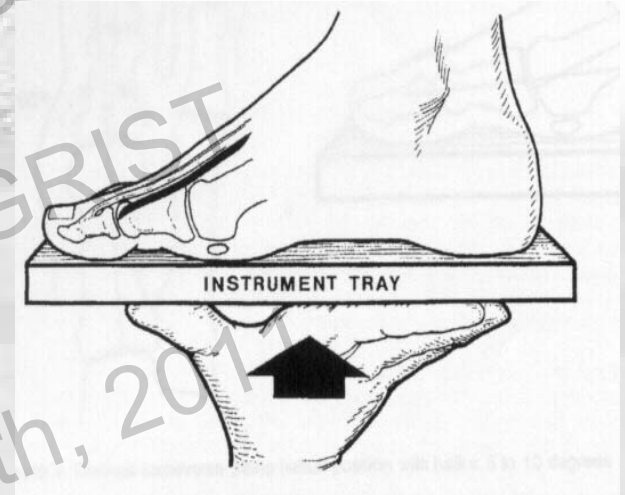
Position

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Position



male



female

15° to 20° valgus

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Position



Neutral rotation

Arthrodesis of the first metatarsophalangeal joint for hallux rigidus--optimal position of fusion.

Aas M, Johnsen TM, Finsen V.

Foot (Edinb). 2008 Sep;18(3):131-5

Union was observed in 31 out of 39 feet, but the satisfaction rate was not significantly lower in those with pseudarthrosis.

There was no strong correlation between the arthrodesis position and patient satisfaction.



Fixation

Dorsal plate with interfragmentary compression screw



2 crossed screws



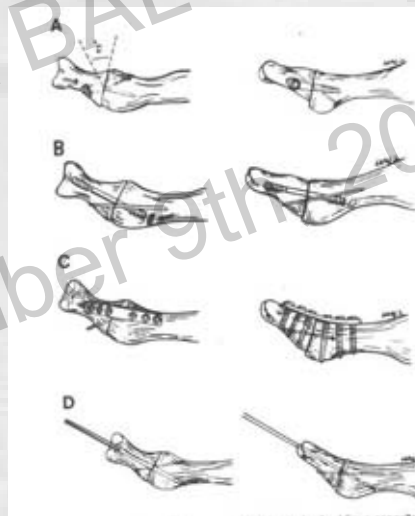
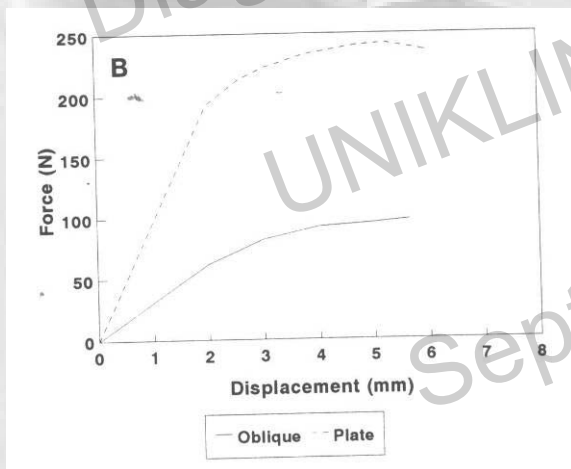


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A Biomechanical Comparison of Four Fixation Methods of First Metatarsophalangeal Joint Arthrodesis

Kurt M. Rongstad, M.D.,* Gary J. Miller, Ph.D.,† Robert A. Vander Griend, M.D.,‡ and David Cowin, B.A.§
Gainesville, Florida

Dorsal plate was significantly most stable



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Arthrodesis of the First Metatarsophalangeal Joint: A Biomechanical Study of Internal Fixation Techniques

Mark J. Curtis, F.R.C.S.,* Mark Myerson, M.D.,† Riyaz H. Jinnah, M.D.,‡ Quentin G.N. Cox, F.R.C.S.,* and Ian Alexander, M.D.§
London, England, Baltimore, Maryland, and Akron, Ohio



Conical reaming with 1 screw more stable than flat cut with plate and screw or K-wire

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Cost comparison of crossed screws versus dorsal plate construct for first metatarsophalangeal joint arthrodesis.

Hyer CF, Glover JP, Berlet GC, Lee TH.

J Foot Ankle Surg. 2008 Jan-Feb;47(1):13-8

No statistical difference was found in the time to fusion between the 2 constructs but there was strong statistical difference in hardware cost.



Fixation



First compression screw



Then dorsal plate



Fixation



Postoperative regimen

Good bone quality, compliant patient
post OP shoe



Poor bone quality,



cast





Professional soccer players Continued career



Anton Ehmann



Andreas Herzog



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Our own study

Retrospective case series (level IV)

90 patients

Single surgeon population

Indication:

Hallux rigidus stage III Regnault;
failed previous Hallux valgus surgery

Outcome measures:

patient's satisfaction, AOFAS Score,
Foot Function Index, radiographic assessment,
plantar pressure distribution measurements



Studienprotokoll Pedobarographie bei Hallux rigidus Operationen prä / post Cheilektomie

Patientendaten Datum: Geb.datum:

Name: Vorname:

PLZ: Strasse:

Gewicht: Grösse: Seite: R L

Schuhgrösse:

Beruf: stehend sitzend

OP-Daten

OP-Datum: Absatzhöhe: < 3 cm

OP-Grund: Schmerzen 3-5 cm

Bewegungseinschränkung/Sport > 5 cm

Probleme mit Schuhwerk

Klinische Beurteilung

1. SCHMERZINTENSITÄT		2. TÄTIGKEITSBEEINTRÄCHTIGUNG	
Kein	40	Keine	10
Leicht, gelegentlich	30	Leicht, gelegentlich	7
Mäßig, täglich	20	Mäßig, kein Sport	4
Stark, Dauerschmerz	0	Schwer	0
3. SCHUHWERK		4. MTP-BEWEGLICHKEIT	
Konfektionsschuhe	10	Normal, (75° oder mehr)	10
Breite Schuhe, Einlagen	5	Mäßig eingeschränkt, (30°-75°)	5
Orthopädische Schuhe	0	Stark eingeschränkt, (<30°)	0
5. IP-BEWEGLICHKEIT (plantarflexion)		6. MTP-IP STABILITÄT	
Normal	5	Stabil	5
Stark eingeschränkt	0	Instabil bzw. luxiert	0
7. SCHWIELENBILDUNG bei HALLUX		8. FUSSFORM	
Keine oder asymptomatisch	5	Gut, Hallux gerade	15
Schmerzhaft	0	Mäßig, Valgus keine Symptome	8
		Schlecht	0

Spreizfuss: J/N
Hallux valgus: (in Grad):
plantarer Clavus: I II III
Bewegungsausmaß Großzehengrundgelenk (Passivnorm: 75/0/45):
Komplikationen:
Kosmetisches Ergebnis: sehr gut gut befriedigend schlecht

BEMERKUNGEN:

Subjektive Bewertung des OP-Ergebnisses durch den Patienten:
sehr gut gut befriedigend nicht zufrieden

Röntgen: IM: HV: SL: 0 1 2 3 Kongruenz: K/I

Standardized Questionnaire

Kitaoka, HB et al.:
Clinical rating systems for the ankle-
hindfoot, midfoot, hallux, and lesser toes.
Foot Ankle Int 15:349-53, 1994

Independent observer

Pedobarography



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Munich



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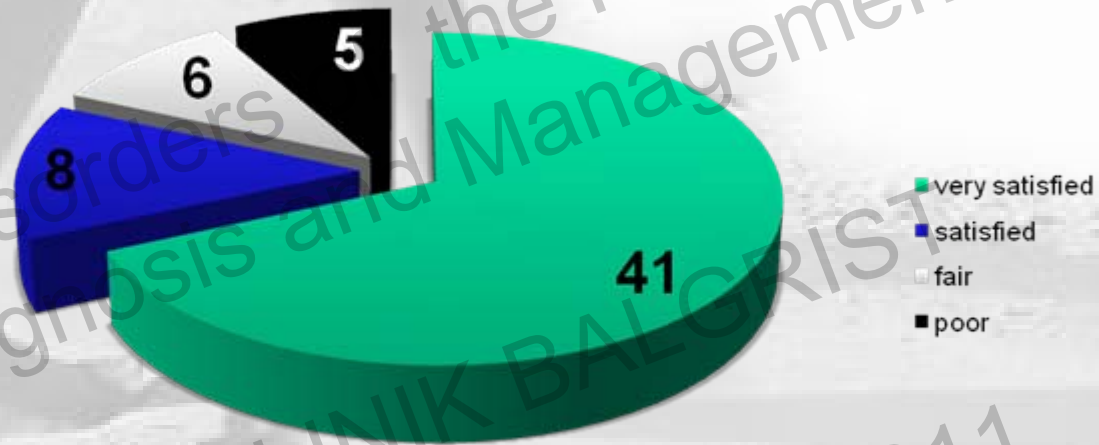
60 patients available for f/u

Mean age: 68.4 y (range: 46 – 84)

Mean f/u: 5.3 (2 – 15)

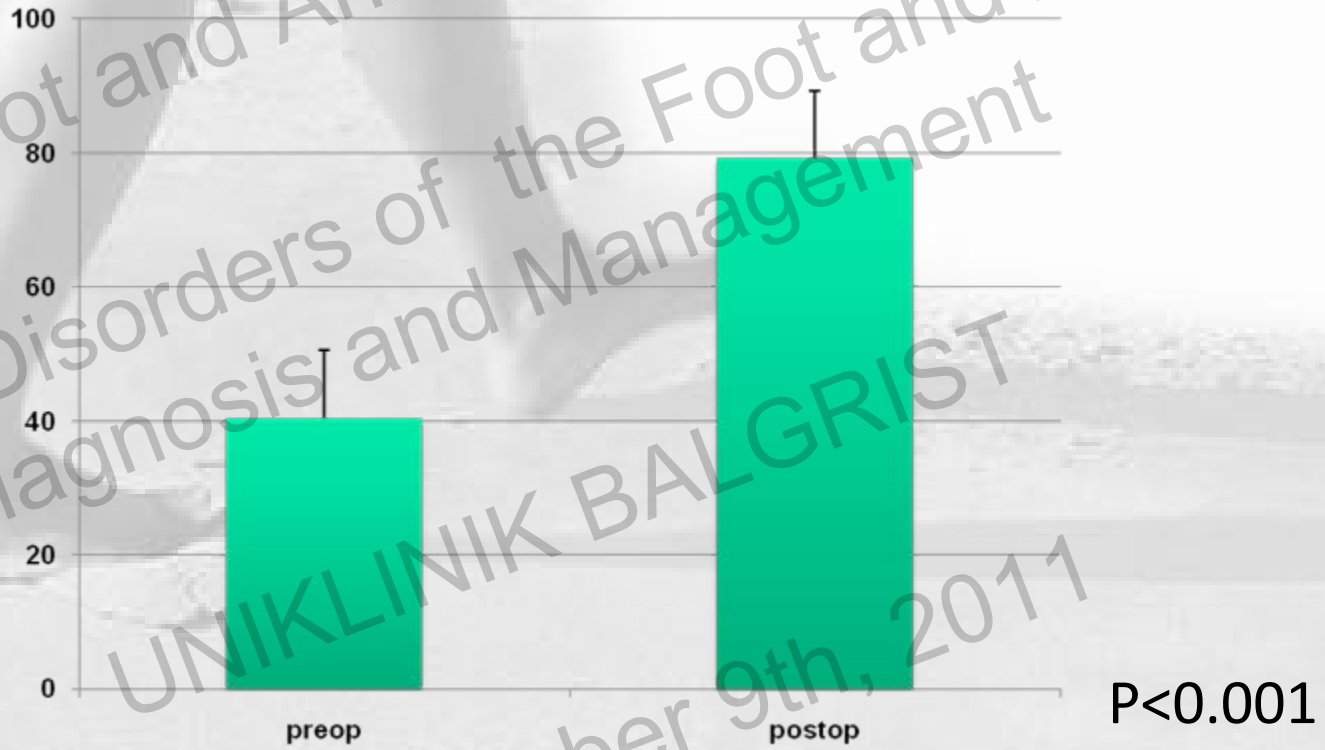


Patient's satisfaction





AOFA Score



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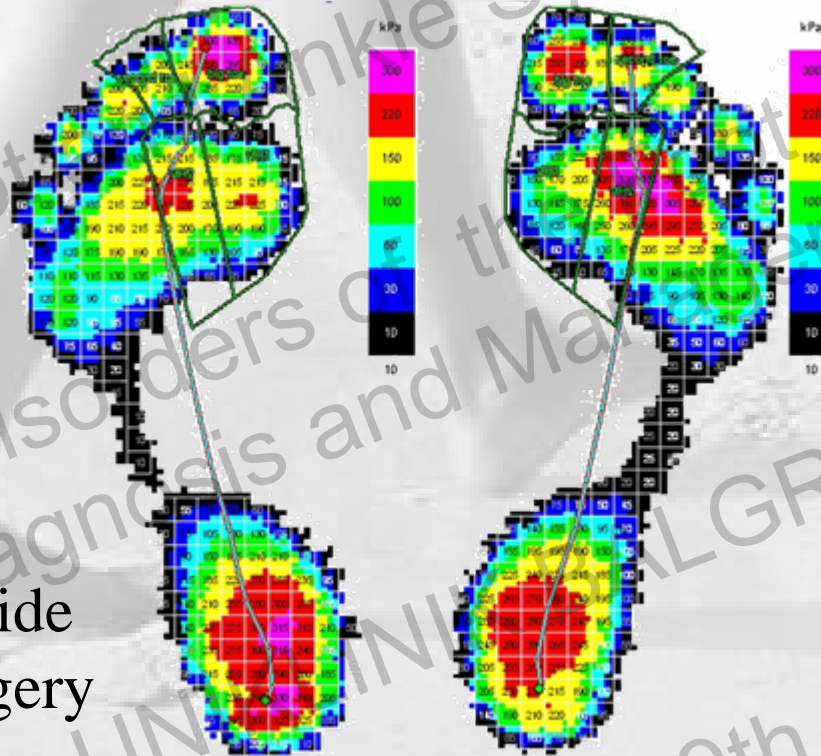


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Druckverteilung und Abrollverhalten



Control side
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Operierte Seite



No non union

No statistically significant changes for plantar pressure parameters (maximum force, peak pressure, contact time and contact area between the operated and the not operated foot)

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Author	Year	patients	f/u	AOFAS Pre/post	Nonunion (%)	Revision (%)
Lombardi et al.	2001	21	28	39/76	14.3	19
Coughlin et al.	2004	34	80	38/89	5.8	0
Aslam et al.	2005	33	28	44/82	3	9
Goucher et al.	2006	53	16	51/82	8	4
Bertena et al.	2006	34	84	7/78	11.7	12
Raikin et al.	2007	27	30	36/84	3.7	0

**Intermetatarsal angular change following fusion
of the first metatarsophalangeal joint**

Pydah SK, Toh EM, Sirikonda SP, Walker CR

Foot Ankle Int 2009 May 415-418

**Intermetatarsal angle improved from 13.1 to 8.6°
Sesamoid position improved 1 grade**

**Intermetatarsal angle after the first metatarso-
phalangeal joint arthrodesis for hallux valgus**

Cronin JJ, Limbers JP, Kutty S, Stephens MM

Foot Ankle Int 2006 Feb. 104 - 109

Intermetatarsal angle improved from 16,65 to 10,35°

Arthrodesis can significantly correct IM angle





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Arthrodesis or Total Replacement Arthroplasty for Hallux Rigidus: A Randomized Controlled Trial

J. N. Alastair Gibson, M.D.¹; Colin E. Thomson, B.Sc. (Hons.)²
Edinburgh, Scotland

Outcomes after arthrodesis were better than those after arthroplasty. The results were partially attributable to an unacceptably high incidence of loosening of the phalangeal components, which resulted in removal of the implants. However, even when data from the failures were excluded, arthrodesis was clearly preferred by most patients.



Comparison of arthrodesis and metallic hemiarthroplasty of the hallux metatarso-phalangeal joint.

Raikin SM, Ahmad J, Pour AE, Abidi N.

J Bone Joint Surg Am. 2007 Sep;89(9):1979-85.

Arthrodesis is more predictable than metallic hemiarthroplasty for alleviating symptoms and restoring function



First metatarsophalangeal arthrodesis using a dorsal plate and a compression screw.

Kumar S, Pradhan R, Rosenfeld PF.

Foot Ankle Int. 2010 Sep;31(9):797-801

46 patients dorsal plate and compression screw

FU 23 months

Fusion rate 90%

100% patient satisfaction rate

MTP fusion



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Thank you...