
Konversion von Anatomischer auf Inverse Arthroplastik

Karl Wieser

Orthopedics Update 6.3.13

INTRODUCTION

Patients satisfaction (mean f-up: 43 months)

- after Hemi shoulder arthroplasty (HA) → 80.4%
- after Total shoulder arthroplasty (TSA) → 96.7%

"Konversion von anatomischer auf inverse Arthroplastik"

GLENOID EROSION (HEMI)

Mean f-up: 43 months:

→ 8.1% conversion to TSA



Radnay CS, JSES 16:396, 2007

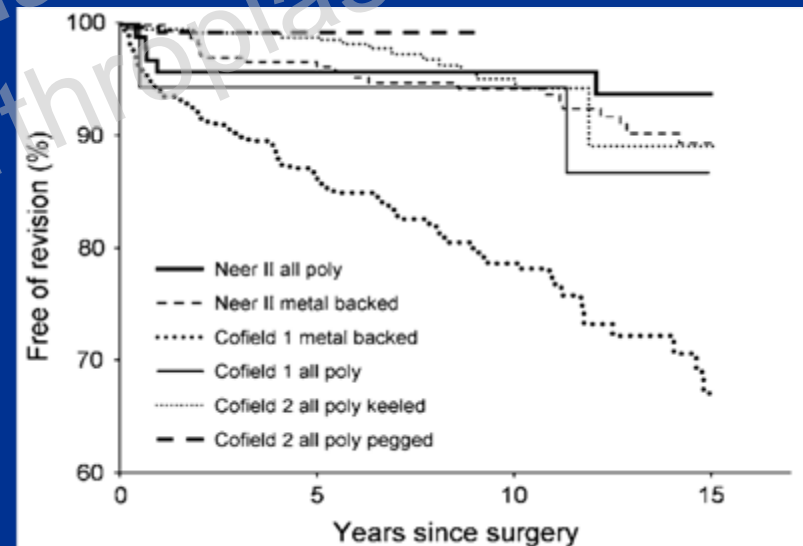
GLENOID COMPONENT LOOSENING

>10y (mean 13.4y) f-up:*

→ 80% radiolucency

→ 34% loosening

→ 7% revision



*Steward MP, JBJS 79-Br: 68, 1997

*Sperling JW, JSES 13:604, 2004

*Torchia ME, JSES 6:495, 1997

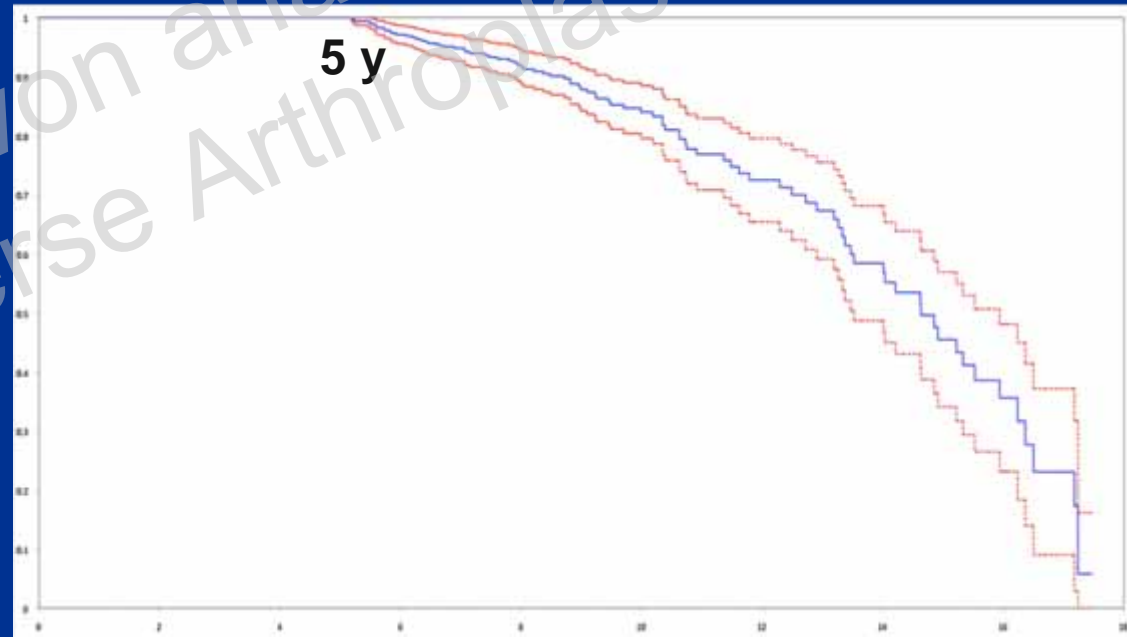
Fox TJ, JSES 18:859, 2009

ROTATOR CUFF TEAR / DYSFUNCTION

mean f-up: 5.3 years:*

→ 1.3 %

(→ >50% SSC)



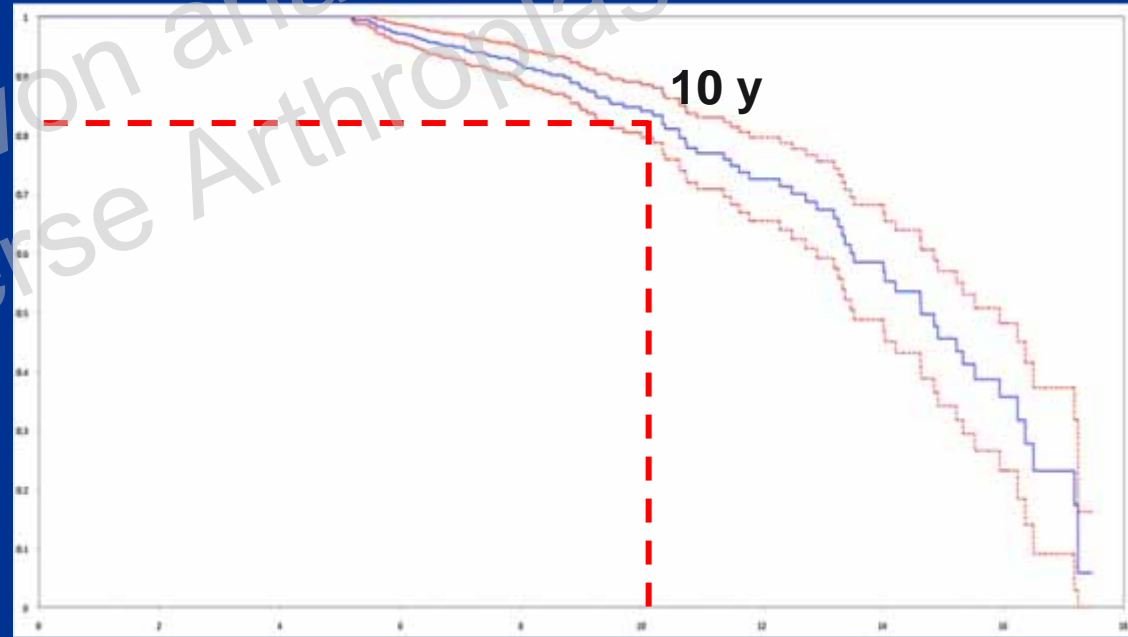
*Bohsali KI, JBJS 88A: 2279, 2006

**Young AA, JBJS 94A: 685, 2012

ROTATOR CUFF TEAR / DYSFUNCTION

mean f-up: 10 years:**

→ 16 %



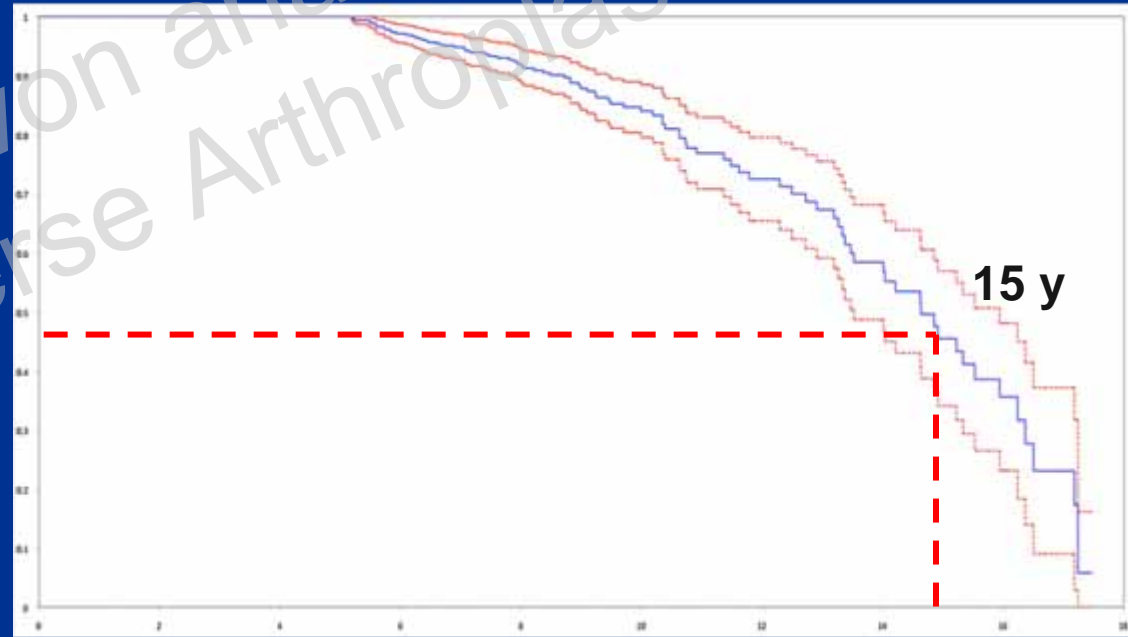
*Bohsali KI, JBJS 88A: 2279, 2006

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ROTATOR CUFF TEAR / DYSFUNCTION

mean f-up: 15 years:**

→ 55 %



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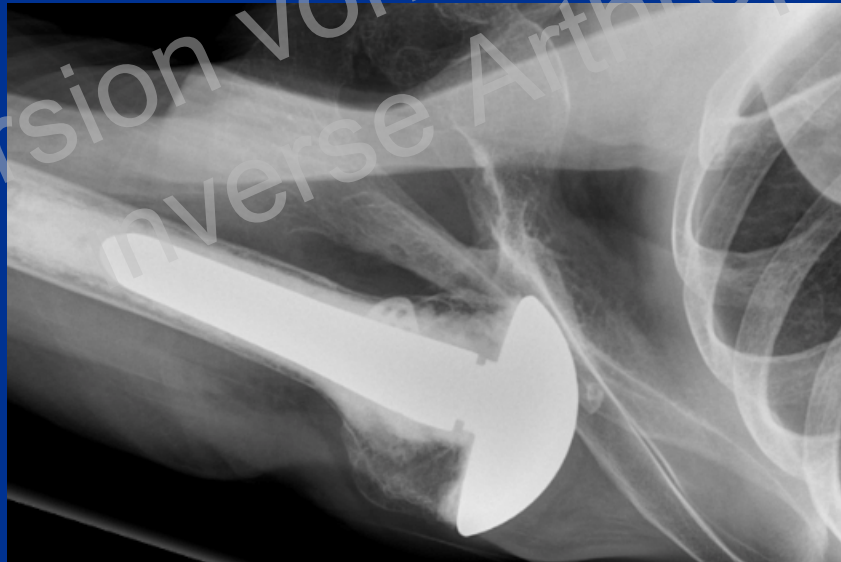
*Bohsali KI, JBJS 88A: 2279, 2006

**Young AA, JBJS 94A: 685, 2012

GLENOHUMERAL INSTABILITY

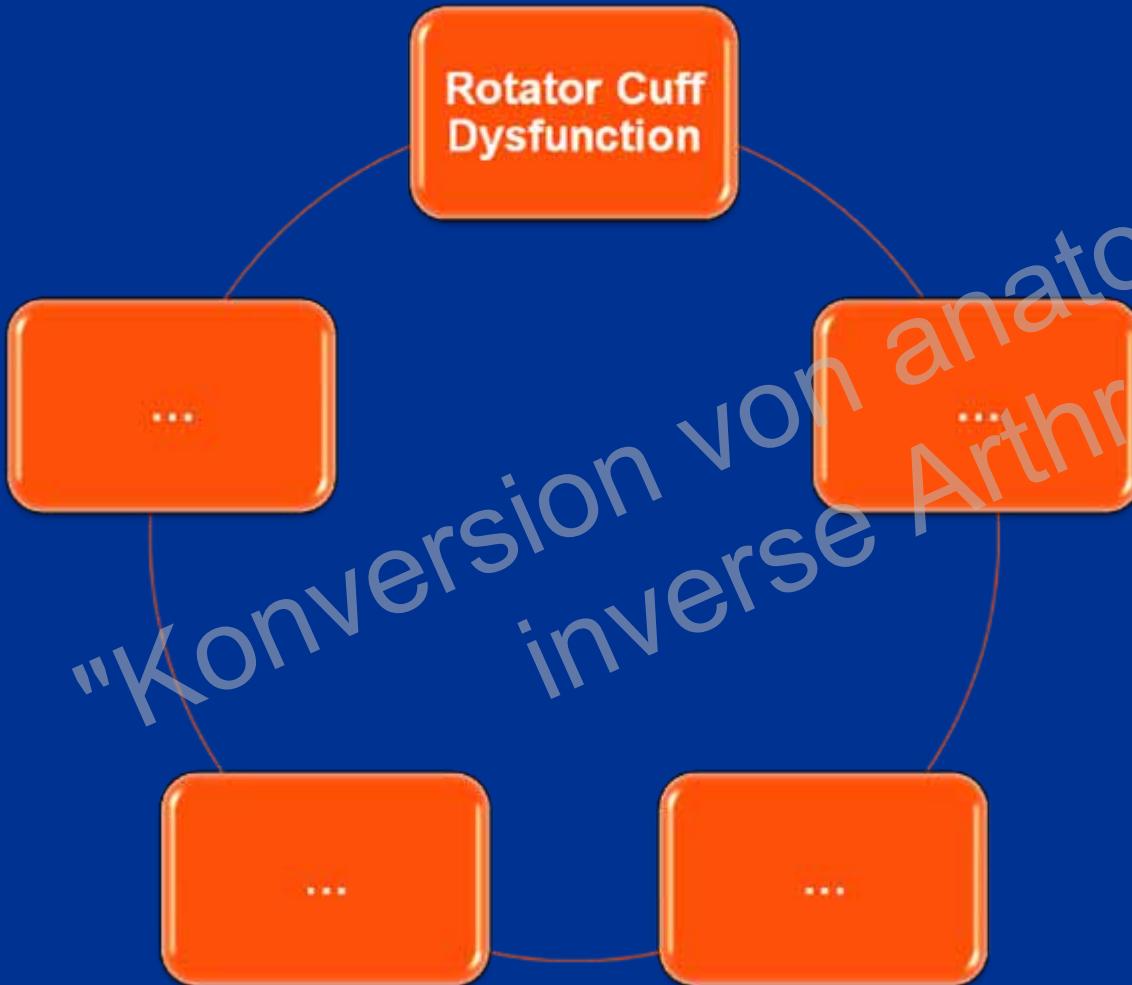
mean f-up: 5.3 years:

- superior: 3%
- posterior: 1%
- anterior: 0.9%

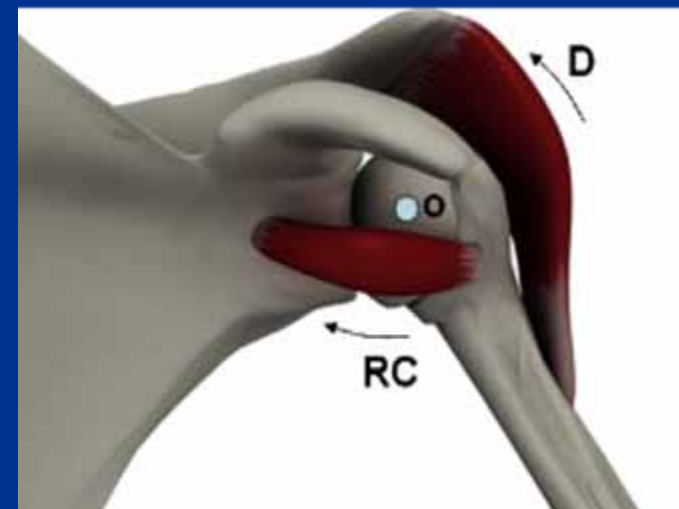
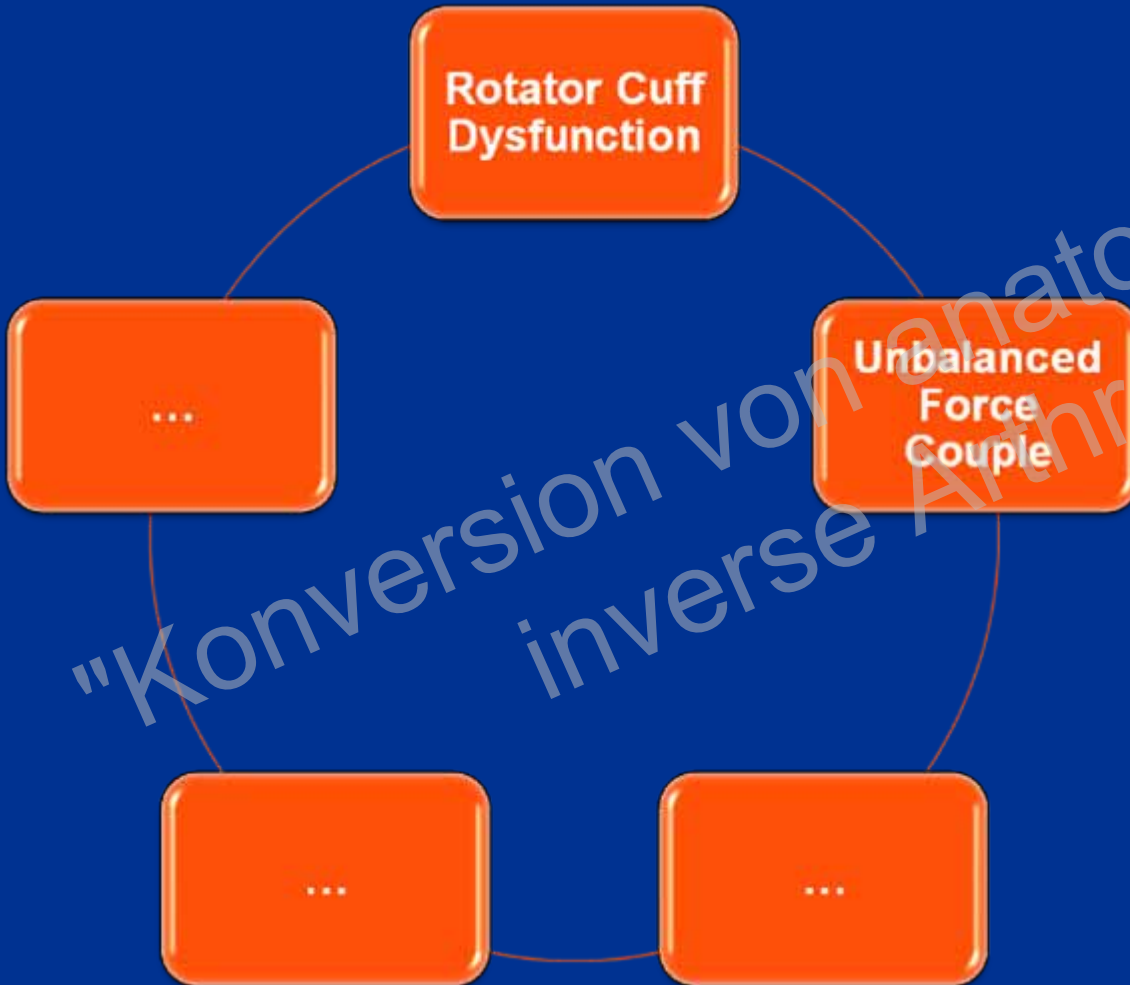


Bohsali KI, JBJS 88A: 2279, 2006

FAILED ANATOMICAL SHOULDER ARTHROPLASTY

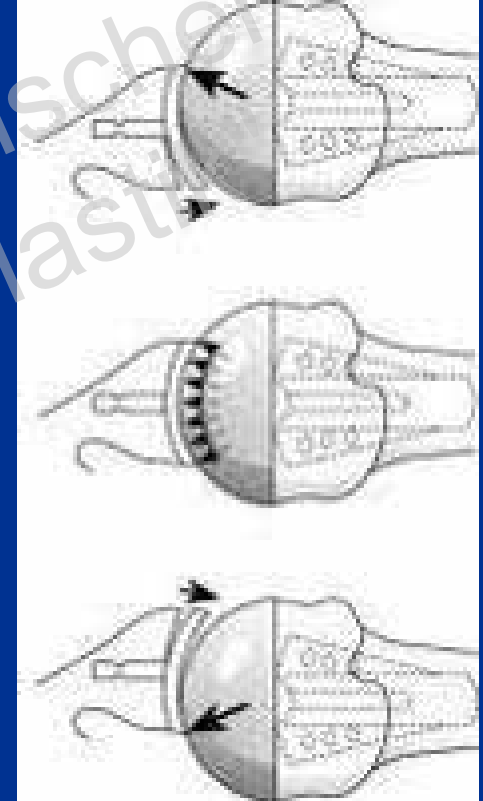
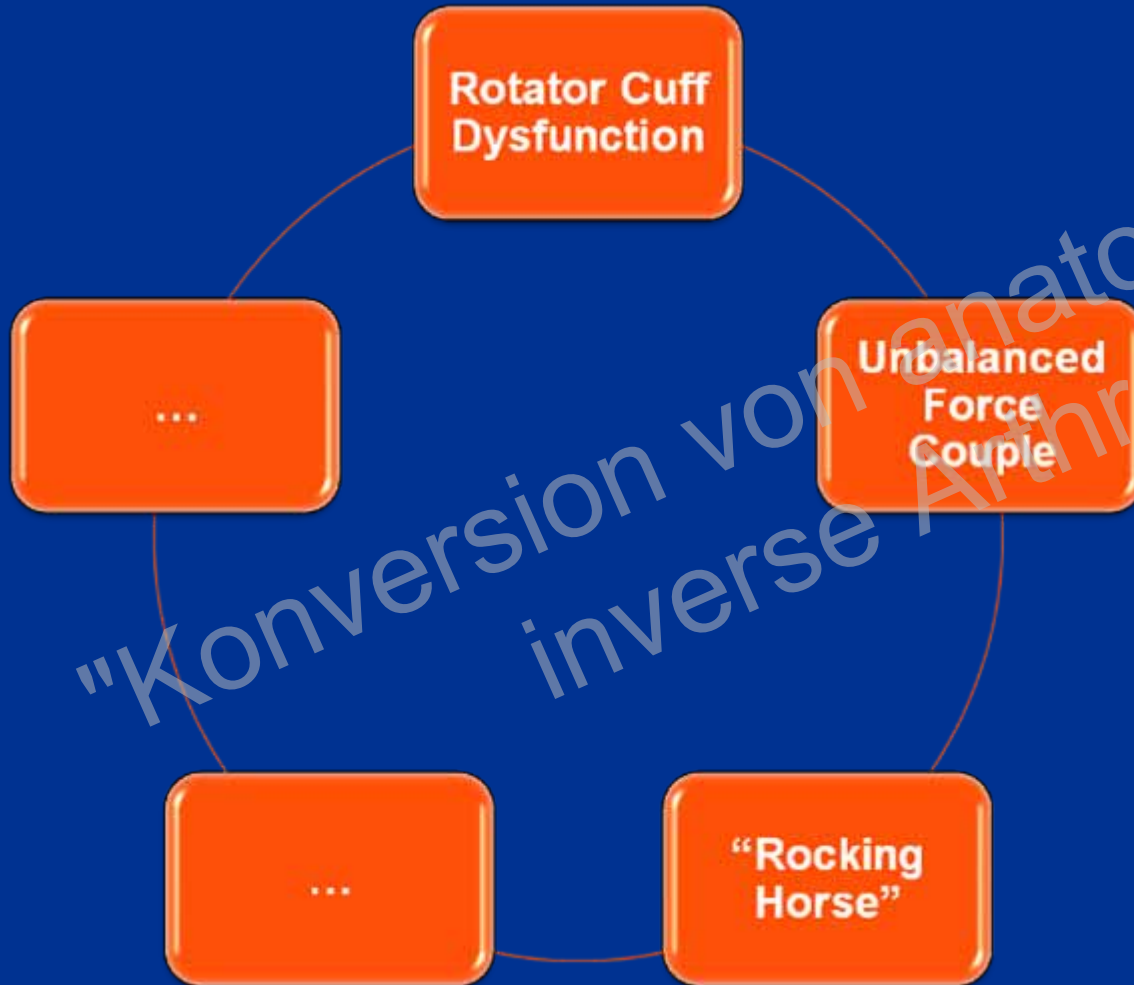


FAILED TOTAL SHOULDER ARTHROPLASTY

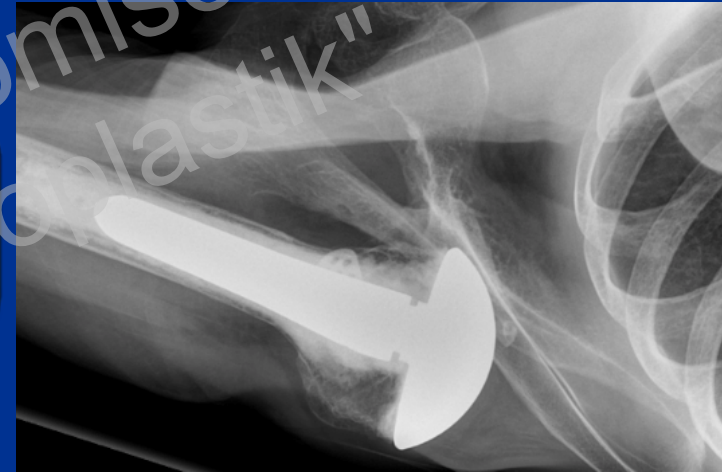
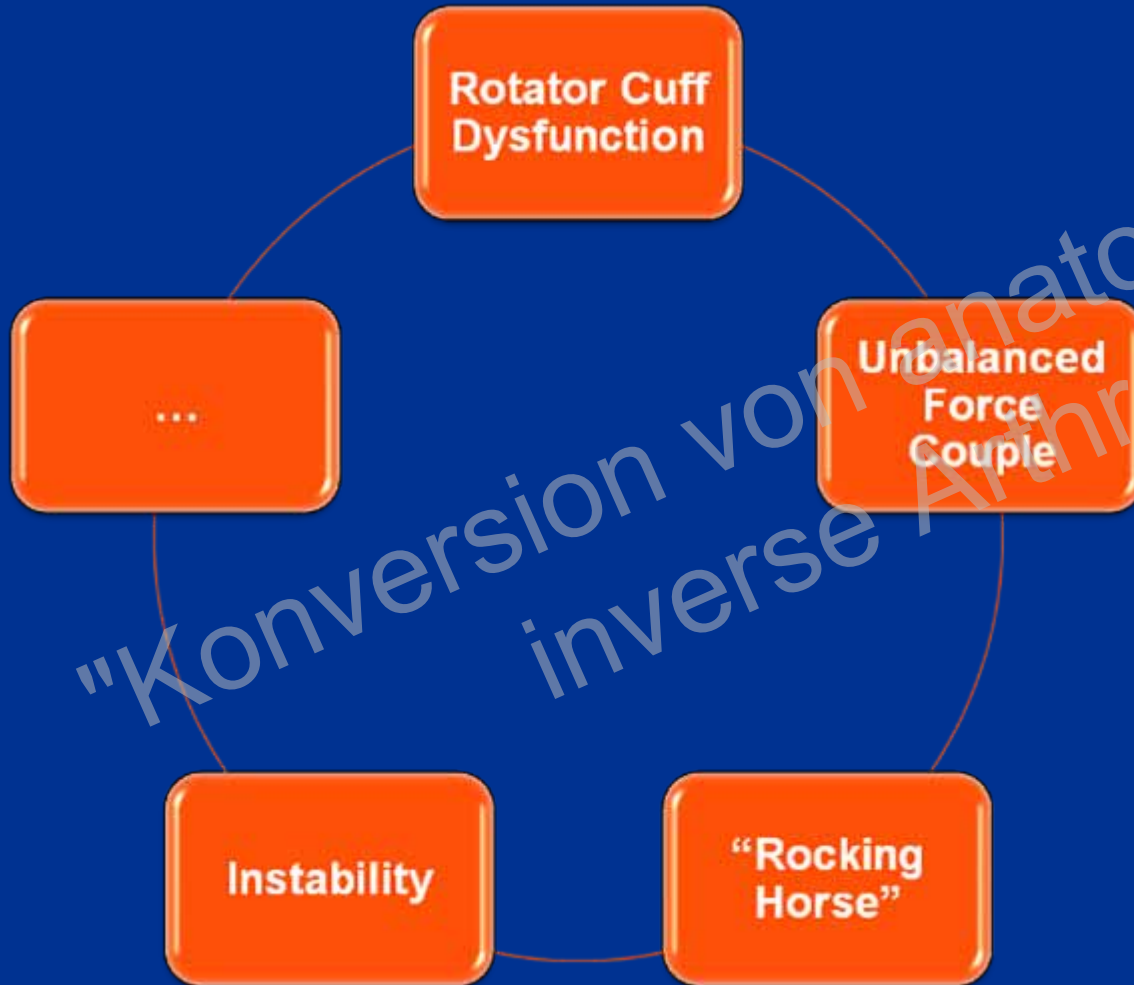


"Konversion von anatomischer auf inverse Arthroplastik"

FAILED TOTAL SHOULDER ARTHROPLASTY



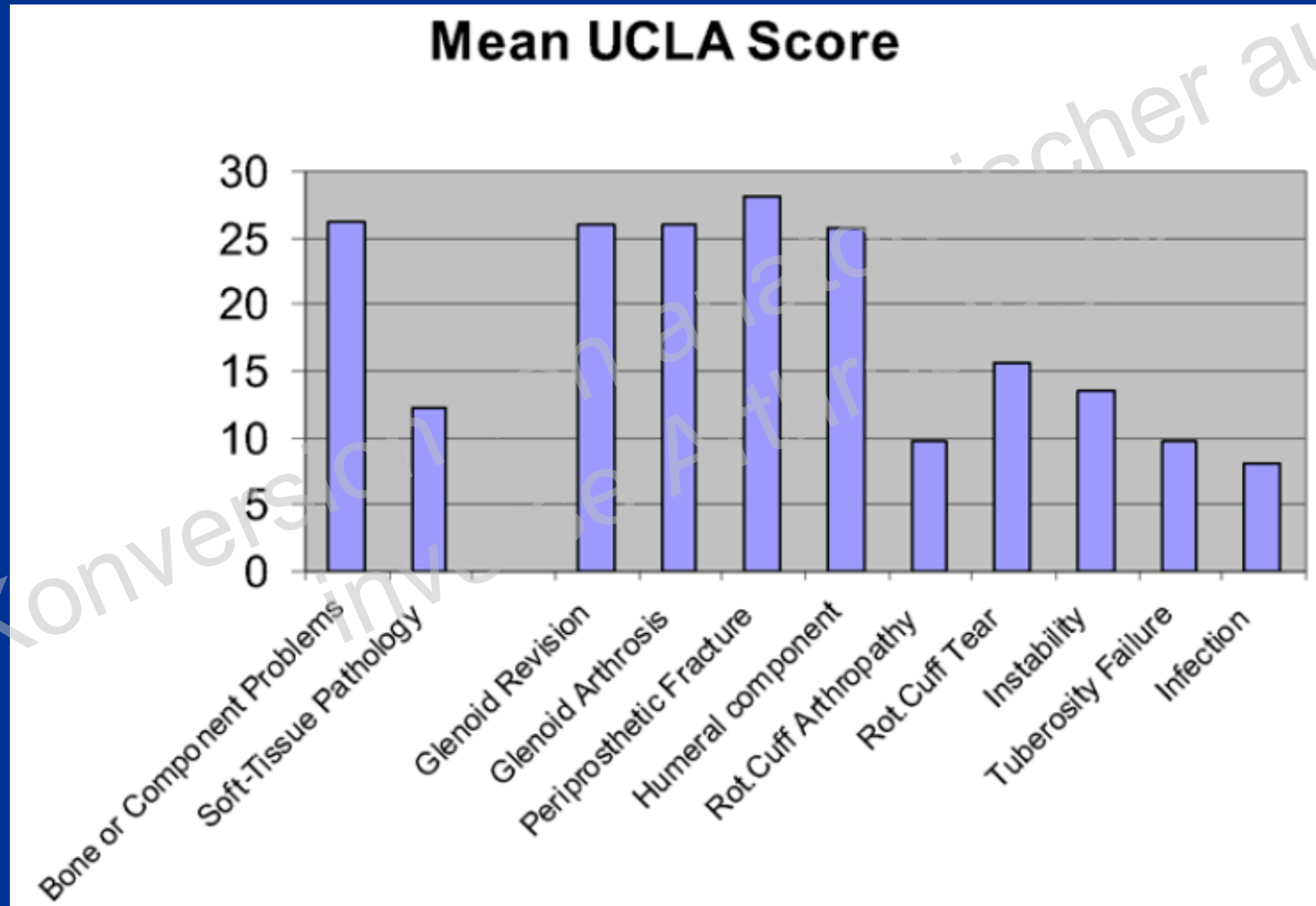
FAILED TOTAL SHOULDER ARTHROPLASTY



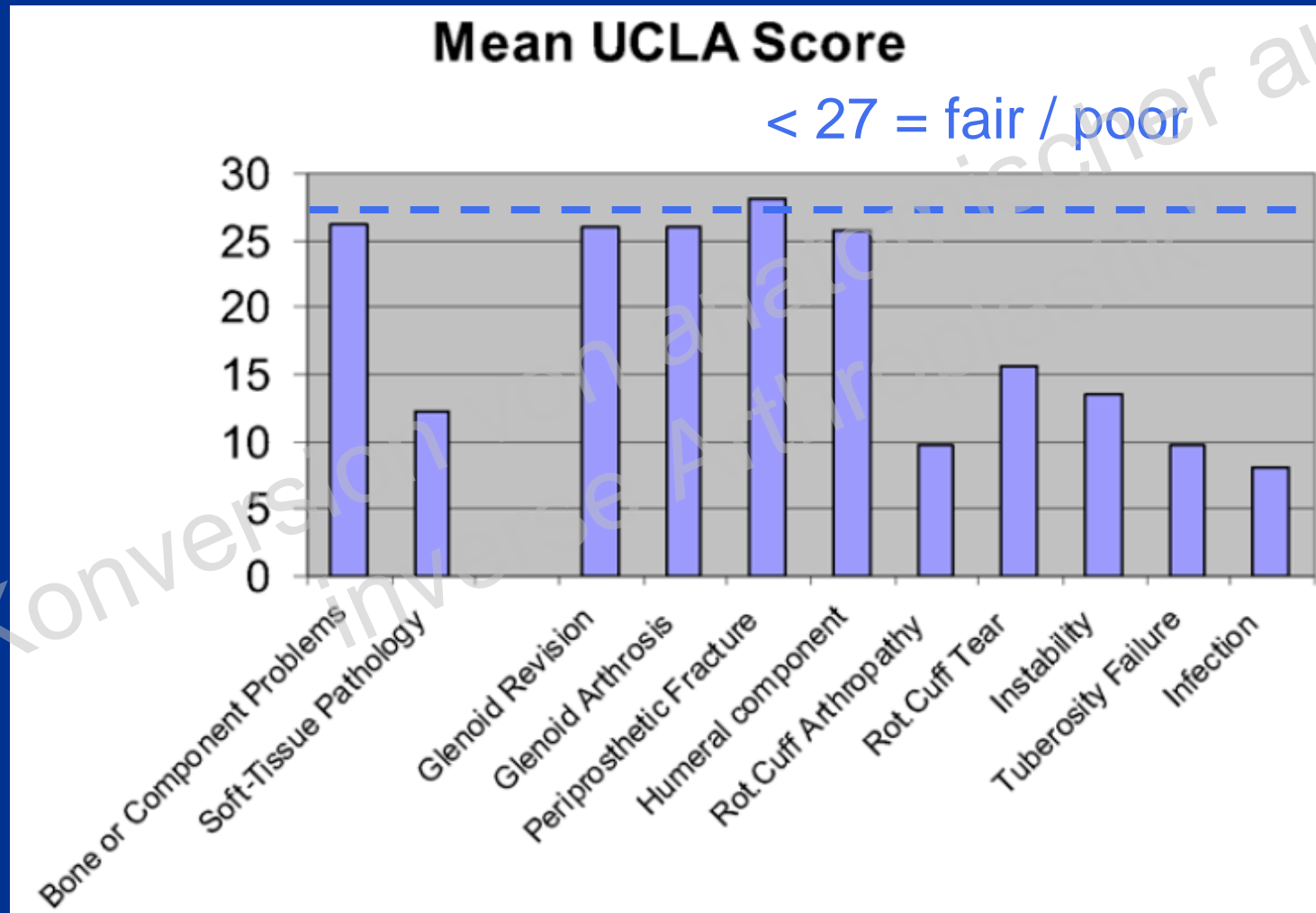
FAILED TOTAL SHOULDER ARTHROPLASTY



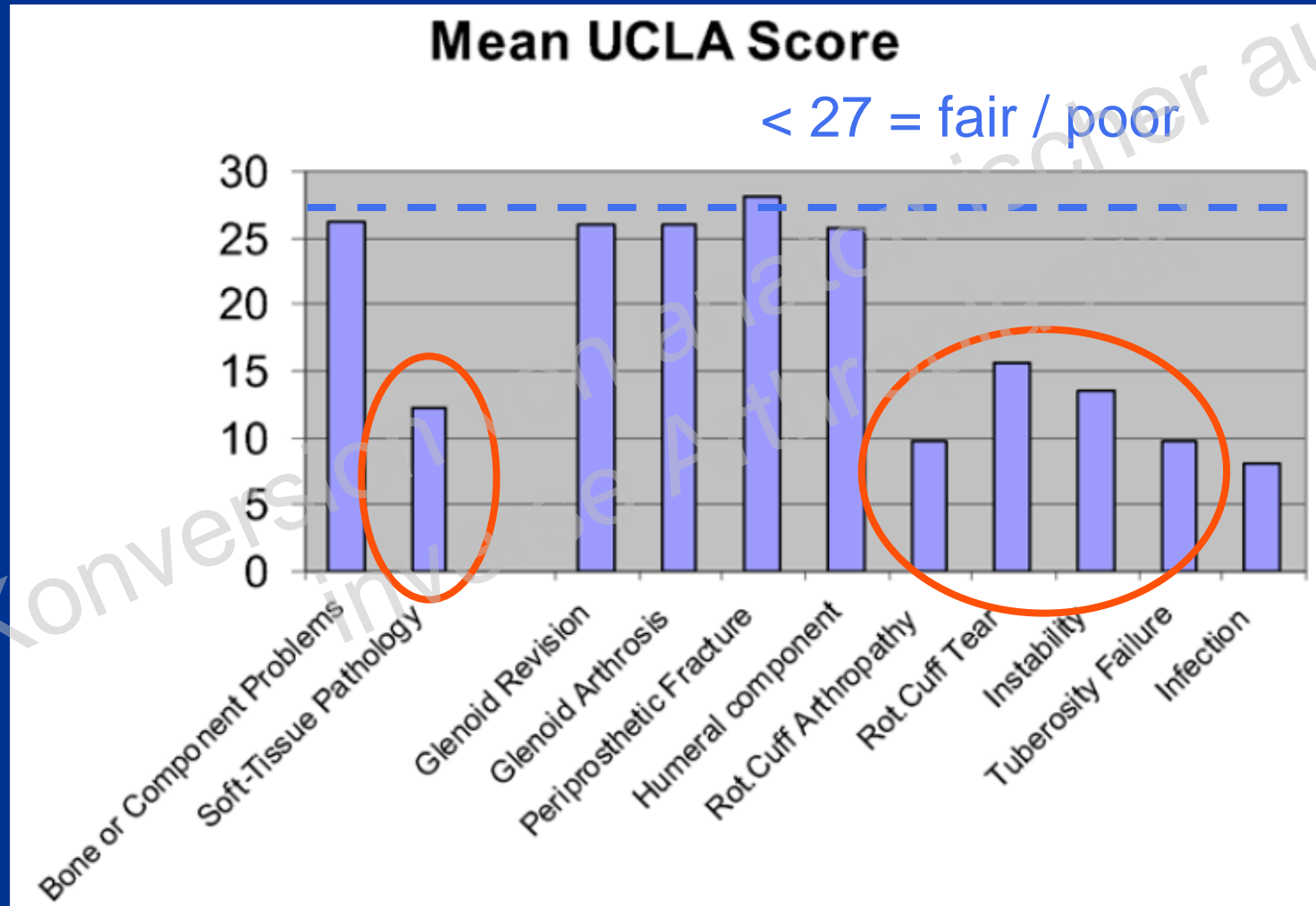
REVISION OF ANATOMICAL SHOULDER ARTHROPLASTY



REVISION OF ANATOMICAL SHOULDER ARTHROPLASTY



REVISION OF ANATOMICAL SHOULDER ARTHROPLASTY



CONVERSION TO REVERSE TOTAL SHOULDER ARTHROPLASTY

Higher constraint prosthetic design
Compensate for muscular imbalance
Addresses glenoid bone loss



Boileau P; JSES 15:527, 2006
Wall B; JBJS Am 89:1476, 2007
Levy JC; JBJS Br 89:189, 2007
Flury MP; Int Orthop 35:53; 2011
Walker M; JSES 21:514; 2012

CONVERSION TO REVERSE TOTAL SHOULDER ARTHROPLASTY

	n	CS	Intraop- complications	Post-op complications	Total complications
Boileau et al.	19	46	n.a.	n.a.	45%
Wall et al.	54	52	24%	n.a.	37%
Levy et al.	29	n.a.	n.a.	n.a.	28%
Flury et al.	21	56	43%	38%	n.a.
Walker et al.	22	n.a.	n.a.	23%	n.a.

Boileau P; JSES 15:527, 2006

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CONVERSION TO REVERSE TOTAL SHOULDER ARTHROPLASTY



	op- lications	Post-op complications	Total complications
Boileau et al	n.a.	n.a.	45%
Wall et al.	24%	n.a.	37%
Levy et al.	n.a.	n.a.	28%
Flury et al.	43%	38%	n.a.
Walker et al.	n.a.	23%	n.a.

Stem loosening: only 1% (5.3 years)

CONVERSION TO REVERSE TOTAL SHOULDER ARTHROPLASTY

Author	Complication	Conversion rate
Boileau et al.	n.a.	0%
Wall et al.	24%	0%
Levy et al.	n.a.	0%
Flury et al.	43%	0%
Walker et al.	n.a.	0%

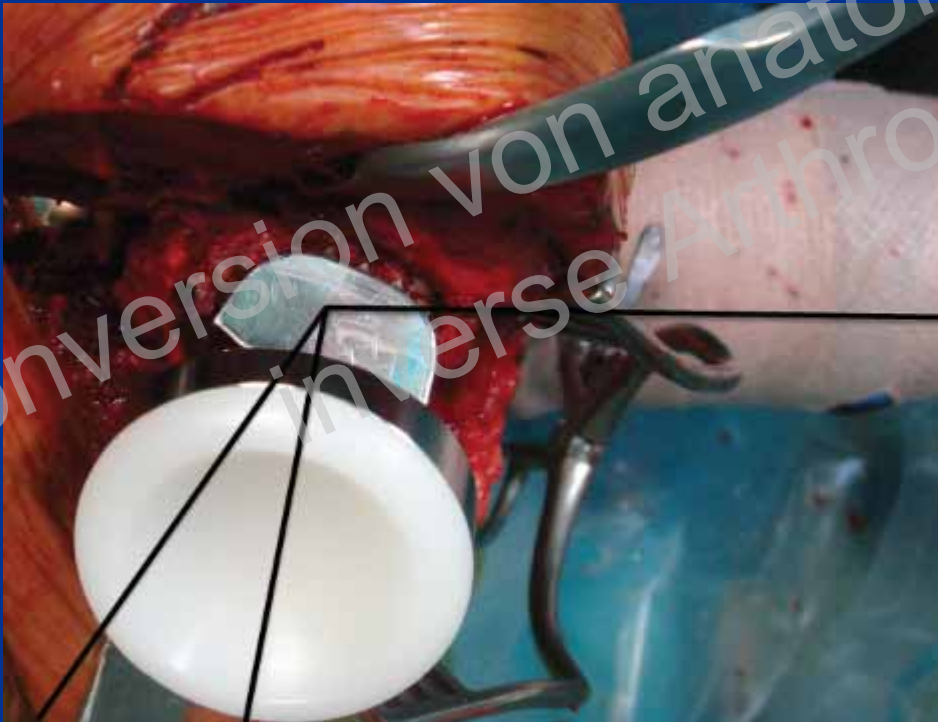
Intraoperative fracture / bone loss

MODULAR PROSTHETIC DESIGN



MODULAR PROSTHETIC DESIGN

Correction of torsion / version



MODULAR PROSTHETIC DESIGN



"Konversion von anatomischer auf inverse Arthroplastik"

MODULAR PROSTHETIC DESIGN



"Konversion von anatomischer auf inverse Arthroplastik"

MODULAR PROSTHETIC DESIGN



"Konversion von anatomischer auf inverse Arthroplastik"

BALGRIST (2005 – 2011)

48 HA

8 TSA



56 RTSA (54 patients)

- Age: 67 (44 – 87) years
- Time to conversion: 38 (0-147) months
- Interventions prior to conversion: 2.2 (1-8)

"Konversion von anatomischer auf inverse Arthroplastik"

PATIENTS (n: 56)

19 modular implants


37 non modular implants

"Konversion von anatomischer auf
inverse Arthroplastik"

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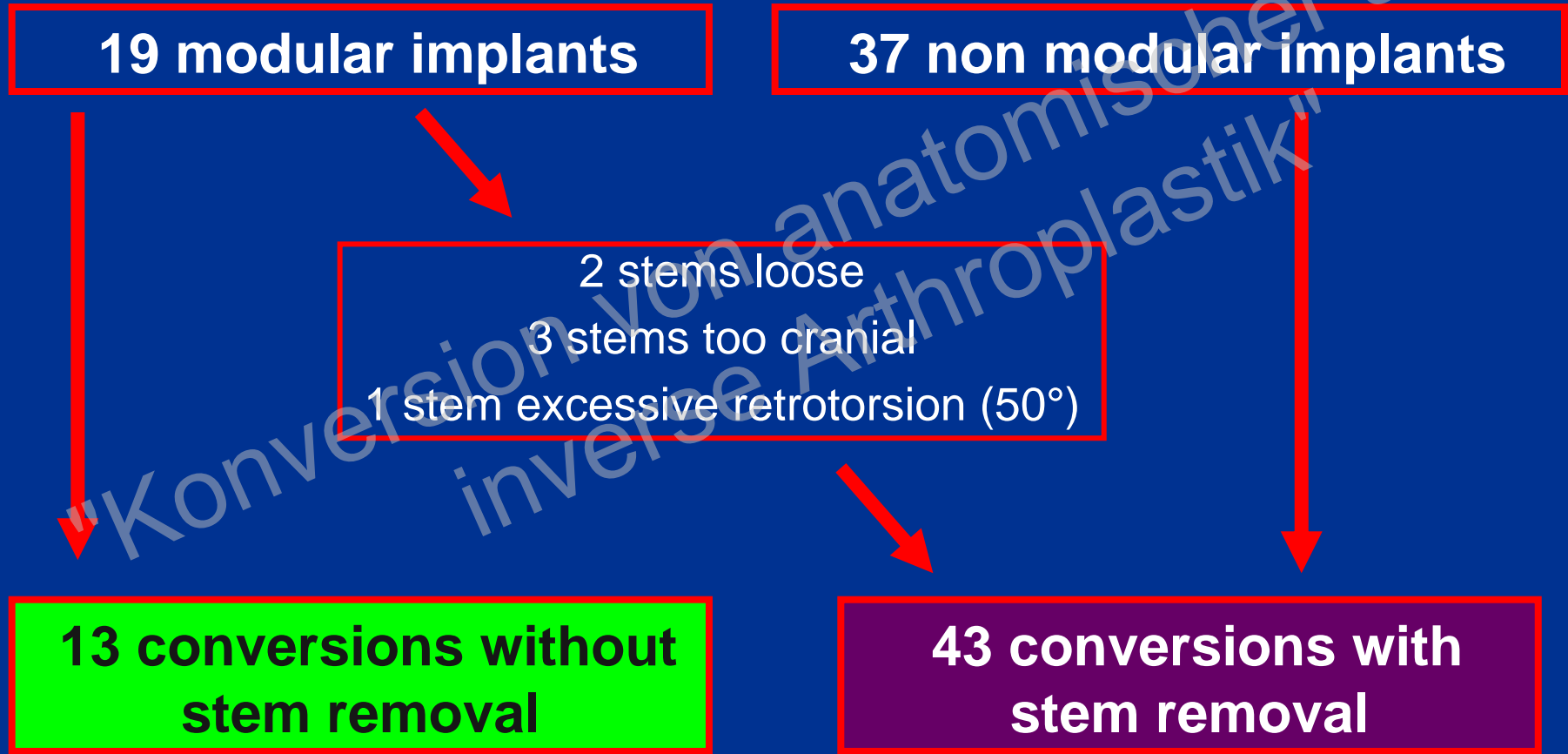
37 non modular implants



2 stems loose
3 stems too cranial
1 stem excessive retrotorsion (50°)

"Konversion von anatomischer auf inverse Arthroplastik"

PATIENTS (n: 56)

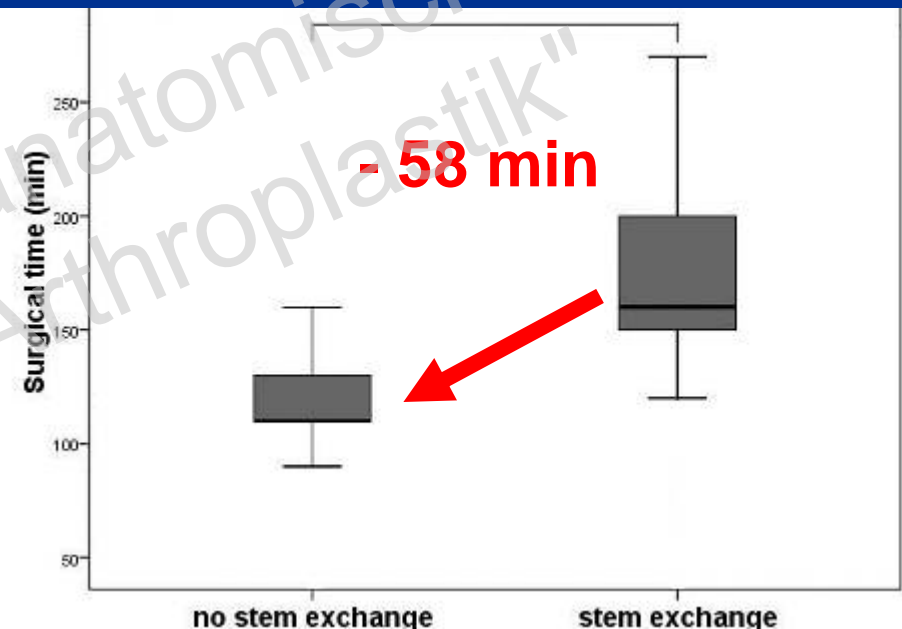
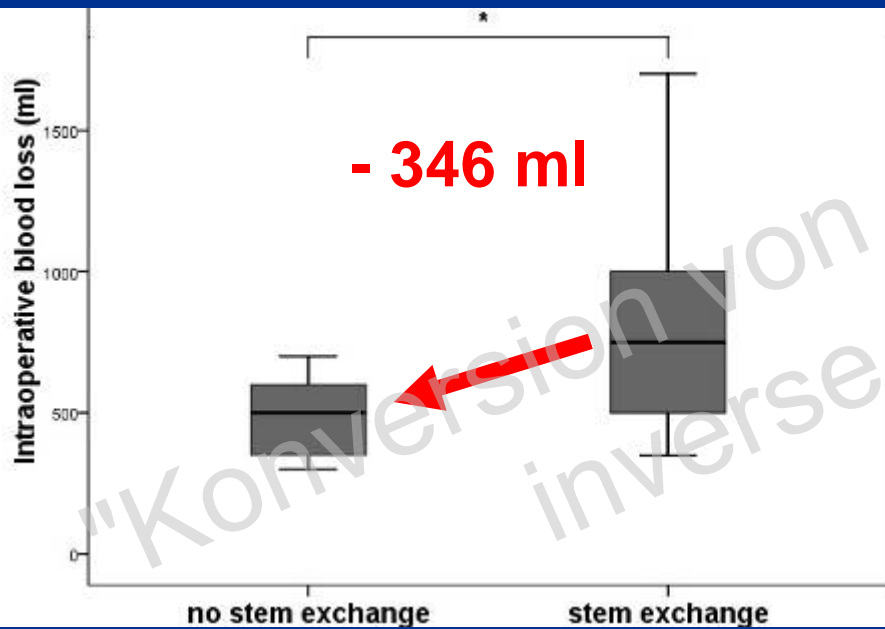


RESULTS:

DEMOGRAPHIC DATA (n: 56)

	Conversions without stem removal (n: 13)	Conversions with stem removal (n: 43)	p:
Age at index surgery	66 (43-85)	63 (41-76)	0.27
Age at conversion	68 (44-87)	67 (44-81)	0.48
Months to conversion	24 (2-93)	42 (0-147)	0.2
Female : Male	10 : 3	30 : 13	0.59
Primary Implant HA : TSA	10 : 3	38 : 5	0.39
Prior intervention	2.6 (1-8)	2.1 (1-8)	0.55

RESULTS: BLOOD LOSS / SURICAL TIME (n: 56)



RESULTS: COMPLICATIONS (n: 56)

Complications	Conversions without stem removal (n: 13)			Conversions with stem removal (n: 43)		
	intraop	postop	Re-op	intraop	postop	Re-op
Shaft fracture	-	-	-	6	1	1
Fracture of greater tub.	1	-	-	2	-	-
Fracture of glenoid	-	-	-	2	-	-
Radial nerve palsy	-	-	-	1	-	-
Cement extrusion	-	-	-	2	-	1
Fracture of Acromion	-	1	-	-	4	1
Glenosphere loosening	-	-	-	-	1	1
Infection	-	1	1	-	1	3
Wound healing problem	-	-	-	-	1	2
Instability	-	-	-	-	1	-
Total	1	2	1	13	9 (7 pat)	9 (6 pat)

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	intraop	postop	Re-op	intraop	postop	Re-op
Shaft fracture	-	-	-	6	1	1
Fracture	-	-	-	-	-	-
Fracture	-	-	-	-	-	-
Radiolucency	-	-	-	-	-	-
Cement	-	-	-	-	-	-
Fracture	-	-	-	-	-	-
Glo	-	-	-	-	-	-
Infection	-	-	-	-	1	3
Wound healing problem	-	-	-	-	1	2
Instability	-	-	-	-	1	-
Total	1	2	1	13	9 (7 pat)	9 (6 pat)

ODDS RATIO:

Intraoperative complication: 5.2 (8% vs. 30%)

Postoperative complication: 1.1 (15% vs. 16%)

Conversion related re-intervention: 1.9 (8% vs. 14%)

RESULTS:

CLINICAL FOLLOW-UP ANALYSIS

- 1 chronic infection (19 months)
- 1 intraoperative shaft fracture (13 months)
- 1 glenoid loosening (21 months)
- 1 persistent instability
- 1 acromion and shaft fx (6 and 30 months)
- 1 left to foreign country (11 months)
- 1 unrelated death (4 months)
- 4 patients refused follow up visit
 - 3 uneventful postoperative course
 - 1 radial nerve palsy after shaft fx

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- 6 complication related drop-outs**

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 - 1 persistent instability
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 - 1 left to foreign country (11 months)
 - 1 unrelated death (4 months)
 - 4 patients refused follow up visit
 - 3 uneventful postoperative course
 - 1 radial nerve palsy after shaft fx
- 5 patients lost to follow-up**

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- 4 patients refused follow up visit
 - 3 uneventful postoperative course
 - 1 radial nerve palsy after shaft fx

==> 45 patients

Follow-up: 37 (12-83) months

6 > 2 years follow-up

9 > 3 years follow-up

14 > 5 years follow-up

1 > 6 years follow-up

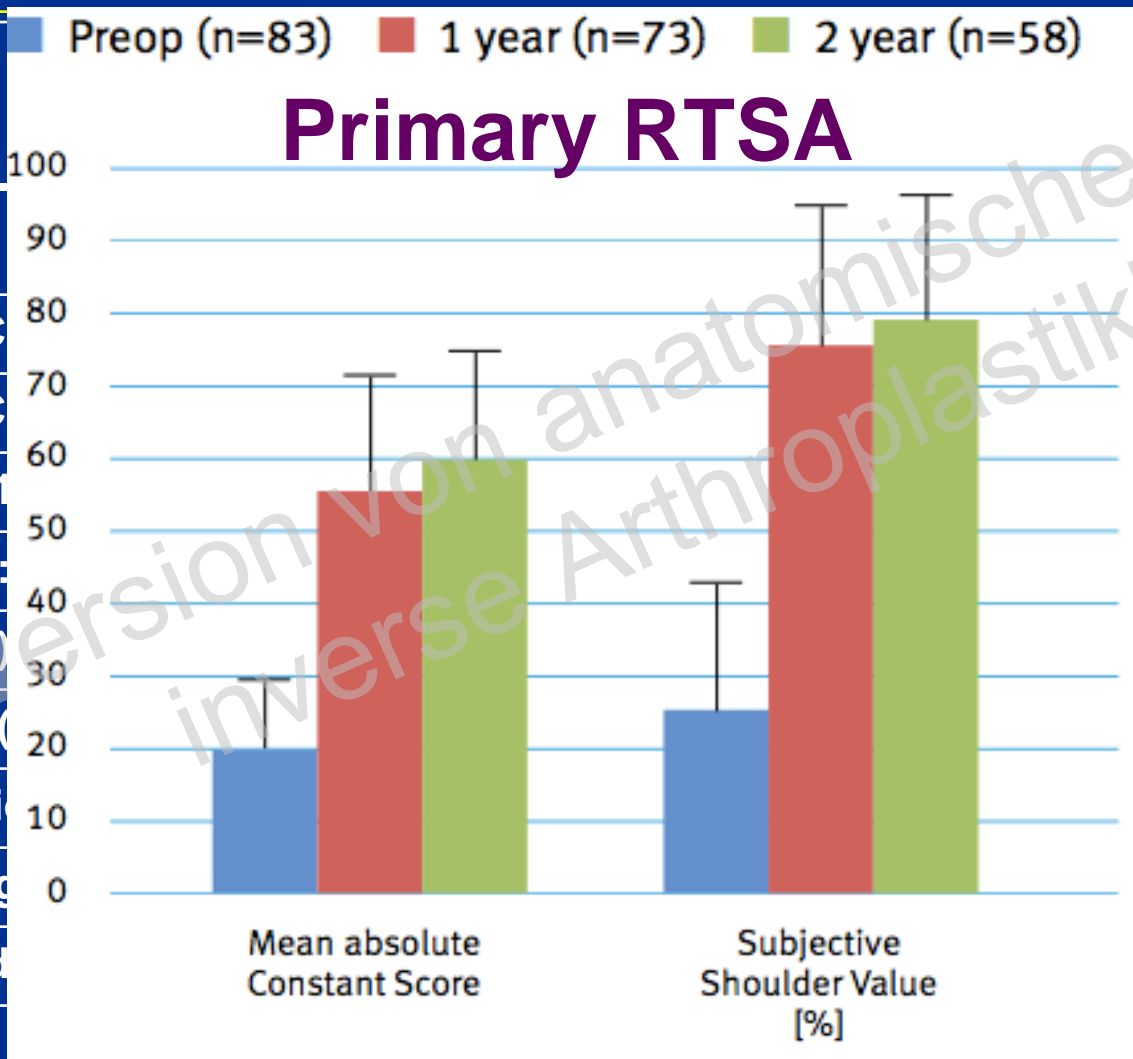
RESULTS:

CLINICAL OUTCOME (n: 45; f-up: 37m)

	Conversions without stem removal (n: 13)		Conversions with stem removal (n: 32)		p:
	pre-op	Follow-up	pre-op	Follow-up	
Absolute CS	30 (10-56)	48 (29-69)	24 (4-68)	45 (18-80)	0.48
Adjusted CS	42 (11-88)	67 (34-100)	32 (6-97)	61 (28-100)	0.34
Pain (max: 15)	6 (3-5)	11 (4-15)	6 (0-15)	11 (3-15)	0.9
Activity (max: 20)	3 (0-6)	7 (3-10)	3 (0-7)	6 (1-10)	0.45
Flexion (°)	74 (0-150)	112 (80-165)	61 (0-140)	108 (30-170)	0.37
Abduction (°)	66 (0-160)	98 (50-150)	54 (0-150)	94 (40-165)	0.66
External Rotation (°)	24 (0-70)	22 (-10-50)	19 (-10-70)	13 (-20-60)	0.7
Abduction strength (kg)	0 (0-1)	1 (0-4)	0 (0-3)	1 (0-5)	0.88
Subjective Shoulder Value	27 (0-50)	55 (20-90)	29 (0-75)	55 (10-100)	0.66

RESULTS:

CLINICAL OUTCOME (n: 45; f-up: 37m)

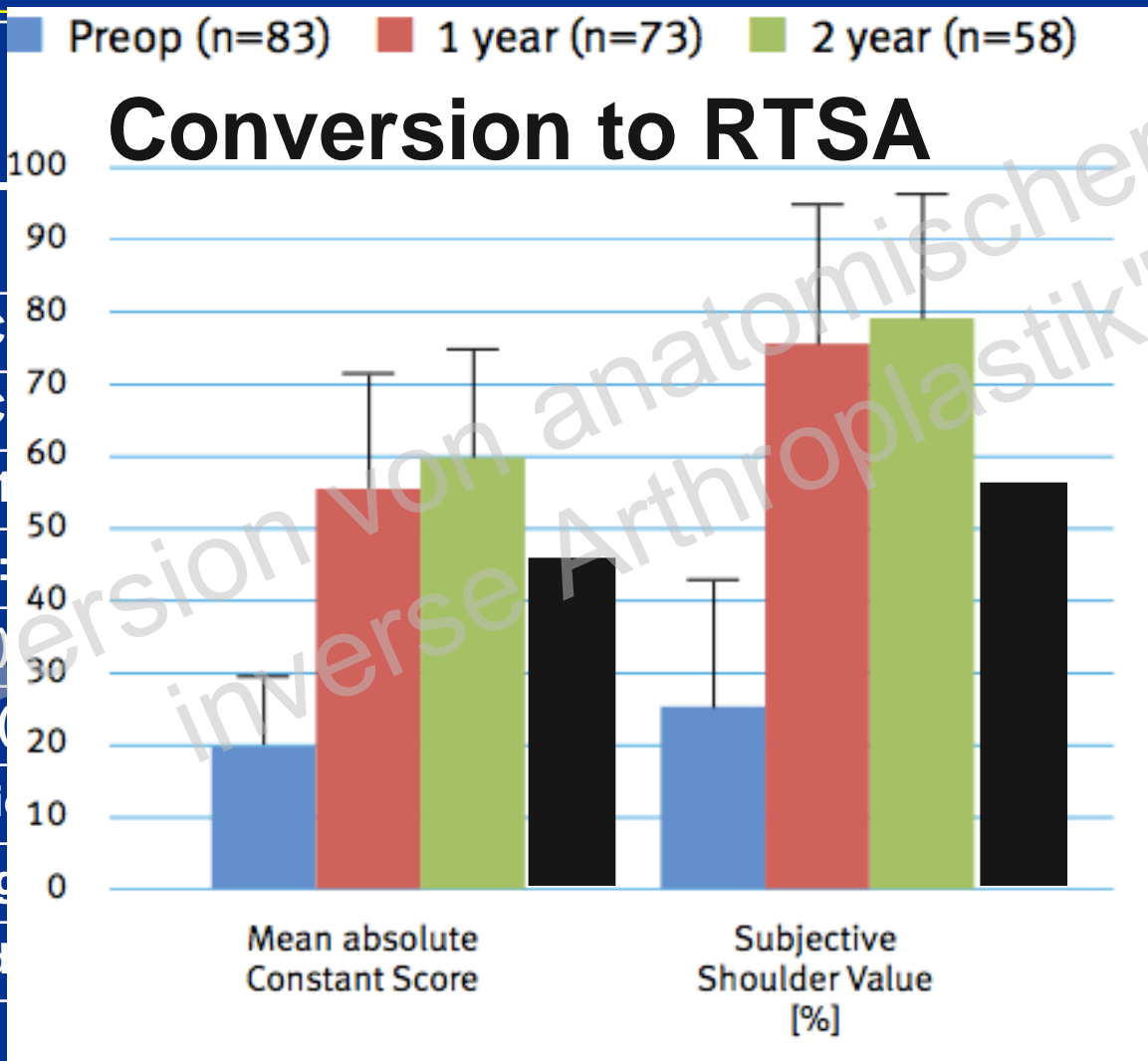


Absolute Constant Score
Adjusted Constant Score
Pain (max: 10)
Activity (max: 10)
Flexion (°)
Abduction (°)
External Rotation (°)
Abduction strength
Subjective Shoulder Pain

Patients with
(n: 32)
Follow-up
p:
5 (18-80)
0.48
(28-100)
0.34
1 (3-15)
0.9
6 (1-10)
0.45
8 (30-170)
0.37
(40-165)
0.66
8 (-20-60)
0.7
1 (0-5)
0.88
(10-100)
0.66

RESULTS:

CLINICAL OUTCOME (n: 45; f-up: 37m)



Absolute C
Adjusted C
Pain (max: 1
Activity (max
Flexion (°)
Abduction (°)
External Rotati
Abduction streng
Subjective Should

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0.45
8 (30-170)
0.37
(40-165)
0.66
8 (-20-60)
0.7
1 (0-5)
0.88
(10-100)
0.66

CONCLUSION

Indication for conversion to RTSA:

Failed anatomical HA / TSA with ...

- rotator cuff deficiency
- w/wo glenohumeral instability
- and/or moderate loss of glenoidal bone stock

"Konversion von anatomischer auf inverse Arthroplastik"

CONCLUSION

Improvement of:

Adjusted CS: 35 → 63 %

Total CS: 26 → 46 points

SSV: 29 → 55 %

Complication rate:

Intra-operative: 25 %

Post-operative: 16 %

Conversion related re-intervention: 13 %

CONCLUSION

Improvement of:

Adjusted CS: 35 → 63 %

Total CS: 26 → 46 points

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CONCLUSION

- surgical time (- 58 min)
- intraoperative blood loss (- 346 ml)
- intraoperative complications (odds: 5.2)
- conversion related re-interventions (odds: 1.9)

... can be reduced by a modular prosthetic design!



Konversion von anatomischer auf
integrale Anthropomatik