

ΕΠΙΠΛΟΚΕΣ ΤΗΣ ΑΝΑΣΤΡΟΦΗΣ ΟΛΙΚΗΣ ΑΡΘΡΟΠΛΑΣΤΙΚΗΣ ΩΜΟΥ

Πώς να τις περιορίσουμε

ΜΑΡΙΟΣ Γ. ΣΑΛΜΑΣ

loosening



infection



instability



scapular notching



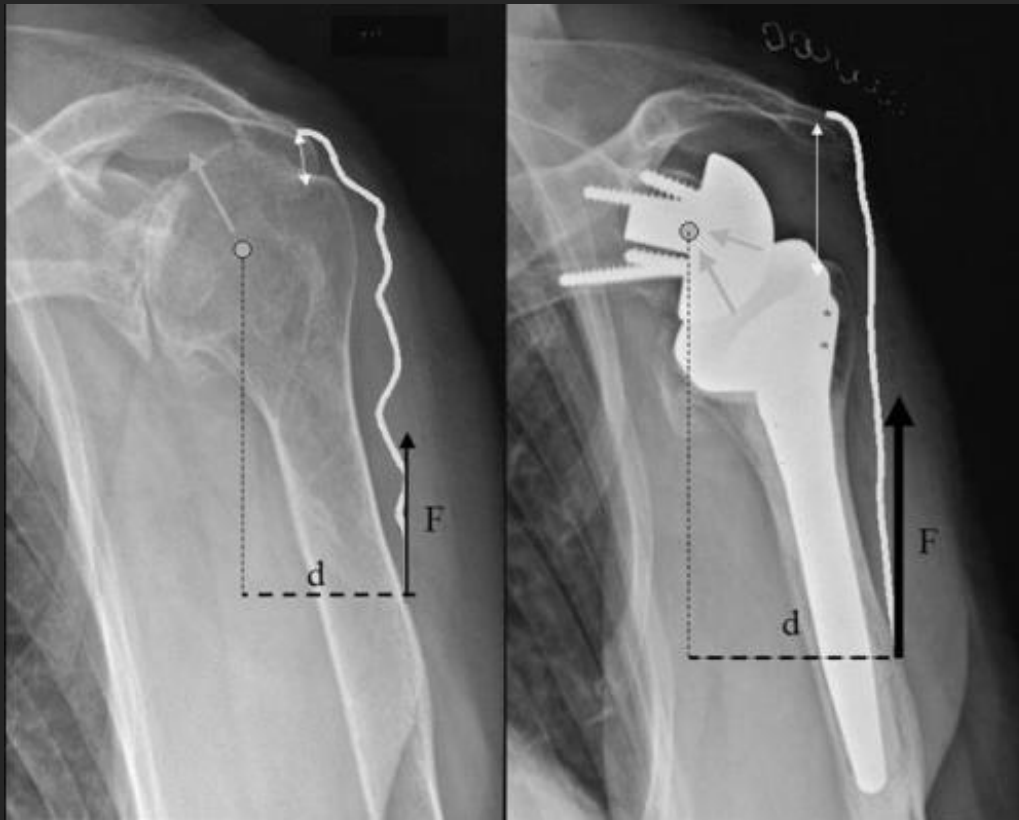
- ▣ Η αναστροφή της “ball-socket” σχέσης της κεφαλής του βραχιονίου και της ωμογλήνης



Μετακινεί το κέντρο περιστροφής της γληνοβραχιόνιας άρθρωσης προς τα έσω και κάτω



Αυξάνει το μοχλοβραχίονα λειτουργίας του δελτοειδούς, επιστρατεύοντας περισσότερες ίνες του για ανύψωση και απαγωγή



Αυτό το επιτυχημένο κλινικά concept, προκαλεί αλλαγές στην φυσιολογία και εμβιομηχανική της άρθρωσης, που αυξάνει το δυναμικό της πρόκλησης επιπλοκών

This clinically successful concept, however, implies changes of joint physiology and biomechanics and might increase the potential for complications

Η ακριβής γνώση της πιθανότητας και των επιπτώσεων των διαφόρων επιπλοκών για κάθε ένδειξη είναι καθοριστική για τη σωστή ένδειξη της RTSA

Precise knowledge of the probability and the implications of the various complications for a given indication would be imperative for judicious use of RTSA

Οι επιπλοκές και η συχνότητα εμφάνισής τους ποικίλουν στην βιβλιογραφία

Οι μελέτες είναι ετερογενείς ως προς τις ενδείξεις τον τύπο πρόθεσης και τον πληθυσμό. Δεν υπάρχει αξιόπιστη ανάλυση των δεδομένων

Οι Farshad και C. Gerber
συγκέντρωσαν την βιβλιογραφία το 2010



Οι πιο συχνές επιπλοκές όπως αναφέρονται στην βιβλιογραφία είναι :

- Διάβρωση του αυχένα της ωμοπλάτης (scapular notching)
- Χαλάρωση της ωμογληνιαίας πρόθεσης ή αστοχία υλικού (glenoid component)
- Αιμάτωμα
- Φλεγμονή
- Αστάθεια
- νευρολογικές επιπλοκές
- κάταγμα ακρωμίου

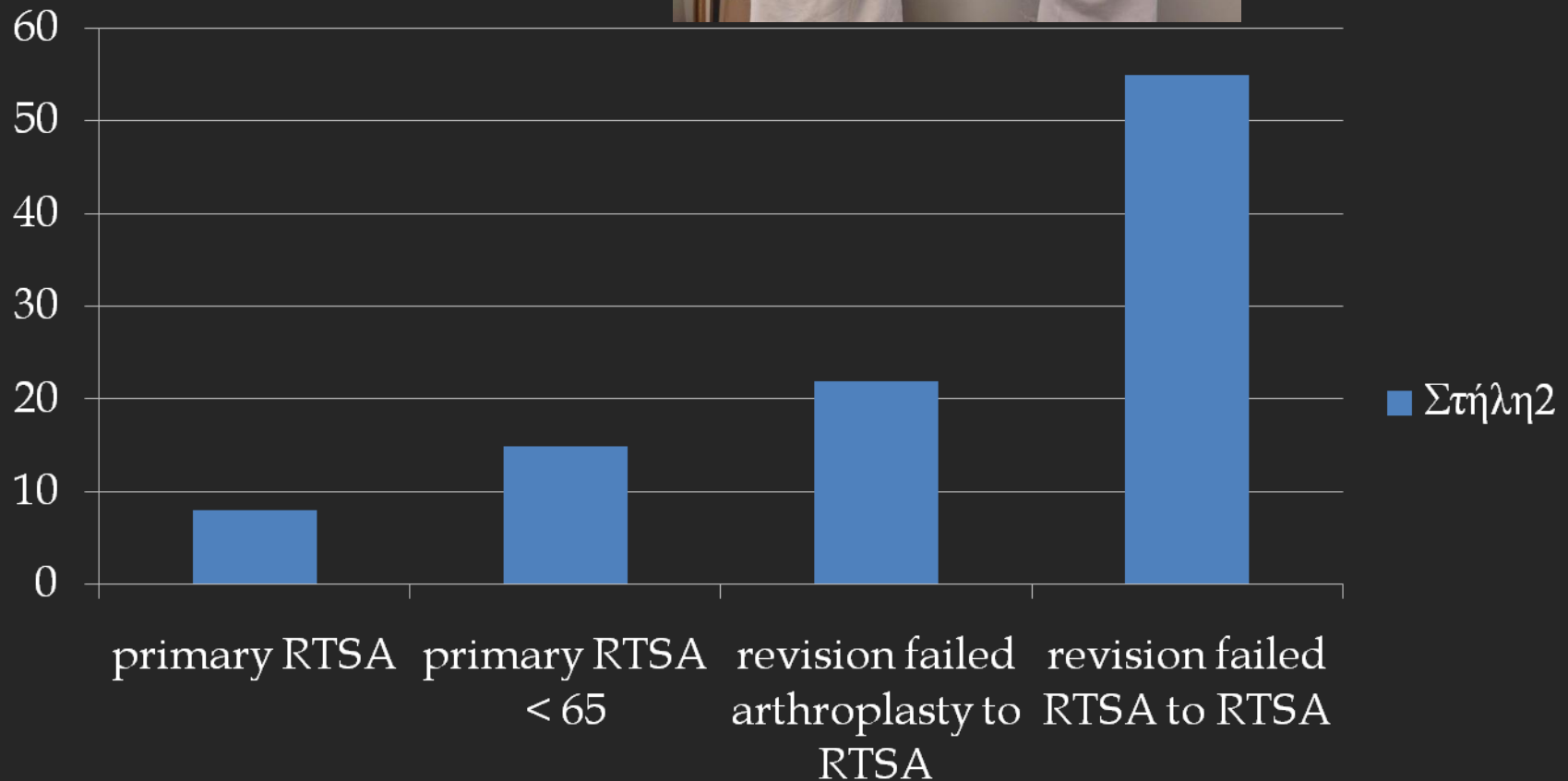
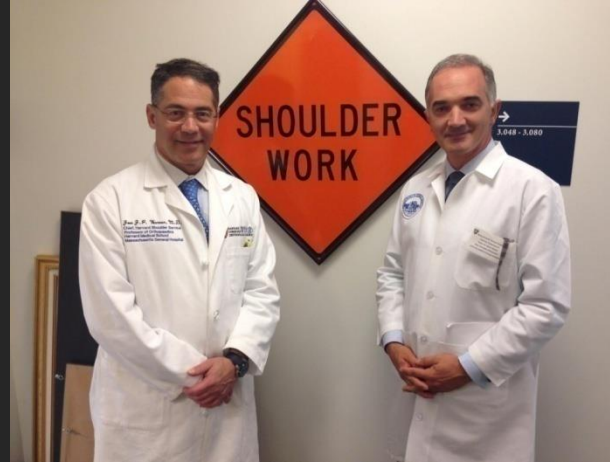
Table 1

Complications of reverse total shoulder arthroplasty (RTSA) found in the literature

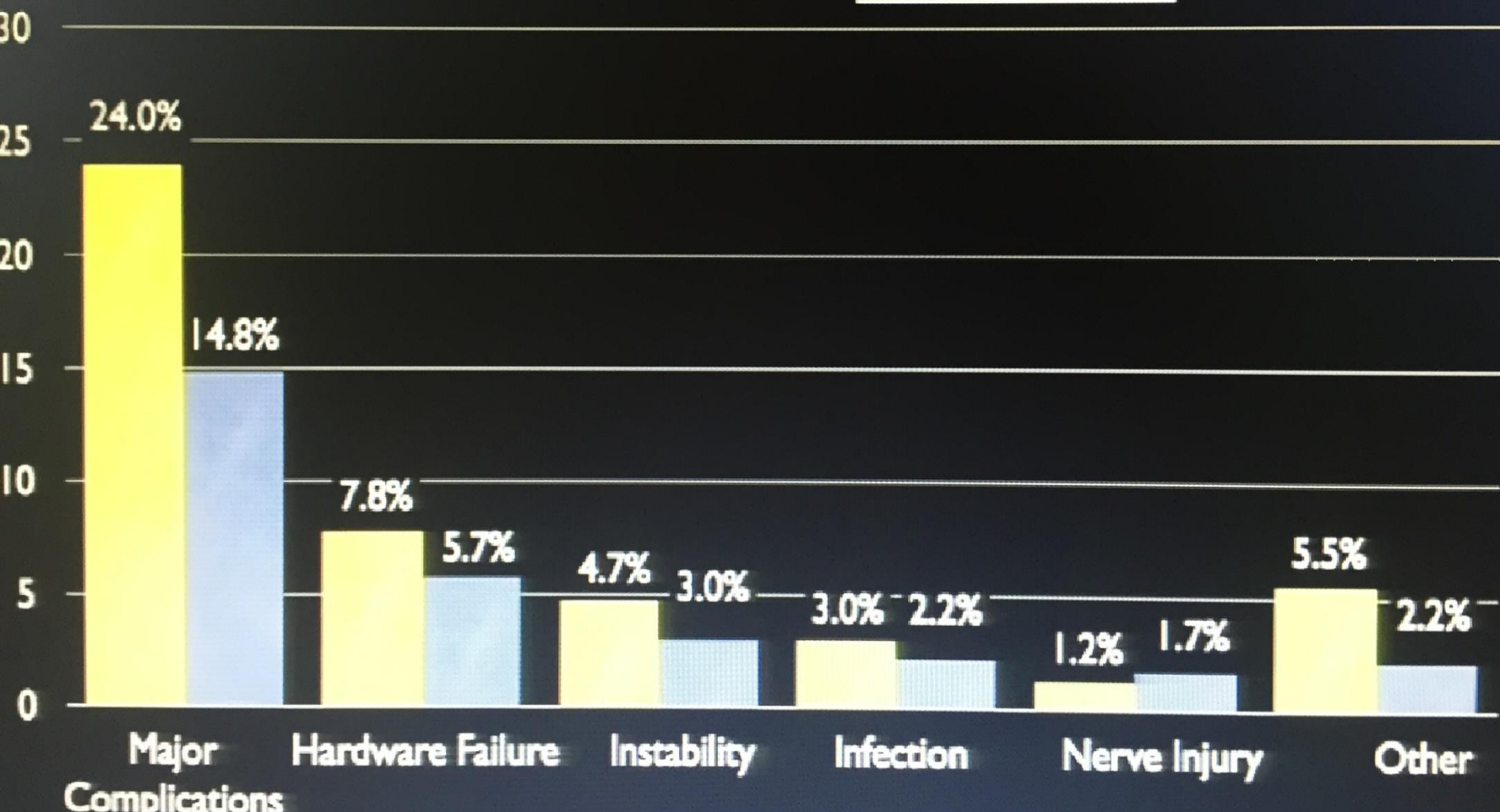
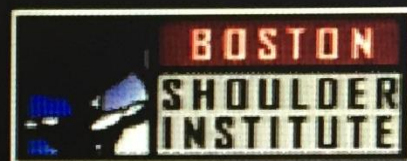
Study	Patient number	Mean follow-up (months)	Haematoma	Infections	Instability	Scapular notching	Glenoidal complications	Humeral complications	Fracture of the acromion	Neurological complications	Prosthesis
Gilbart and Gerber, unpublished data	111	26	17 (15%)	1 (1%)	7 (6%)	21 (19%)	5 (5%)	6 (5%)		4 (4%)	Delta III
Molé and Favard [1], 2006	527		14 (3%)	27 (5%)	18 (3.4%)		27 (5%)	11 (2%)	16 (3%)	6 (1%)	Mostly Delta
Gerber et al. unpublished data (series 2005–2009)	230	22.3	5 (2.1%)	2 (0.8%)	4 (1.7%)	115 (50%)	7 (3%)	1 (0.4%)	5 (2.2%)	11 (4.7%)	Anatomical Inverse
Levy et al. [48], 2007	29	29		1 (3%)	4 (14%)		1 (3%)	1 (3%)		11 (38%^a)	Reverse Shoulder System
Levy et al. [10], 2007	19	44	1 (5%)	1 (5%)		19 (100%)	3 (15%)	2 (10%)	3 (15%)		Encore
Guery et al. [50], 2006	71	70		3 (4%)	2 (3%)		3 (4%)				Delta III
Werner et al. [13], 2005	58	38	12 (21%)	2 (3%)	5 (9%)	56 (96%)	3 (5%)	1 (2%)	4 (7%)		Delta III
Boileau et al. [2], 2005	45	40		2 (4%)		24 (53%)	1 (2%)	3 (7%)			Delta III
Frankle et al. [51], 2005	60	71		2 (3%)		0 (0%)	1 (2%)	1 (2%)	2 (3%)		Reverse Shoulder System
Klein et al. [52], 2008	20	33		2 (10%)	1 (5%)	1 (5%)	0 (0%)	0 (0%)		0 (0%)	Delta III

JP. Warner

Boston Shoulder Institute

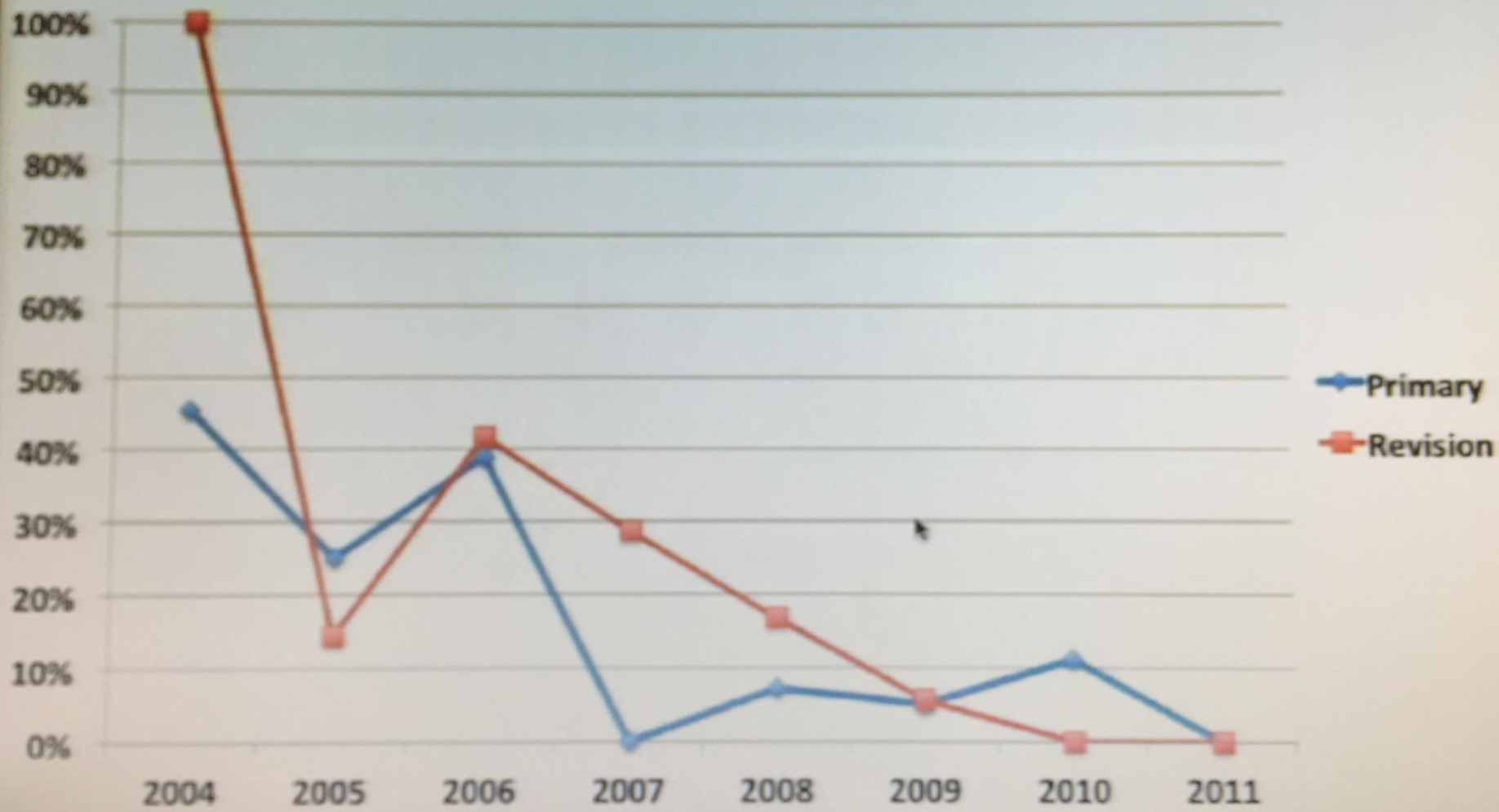


 Zumstein JSES 2011





Reverse Arthroplasty Complication Rate By Primary/Revision



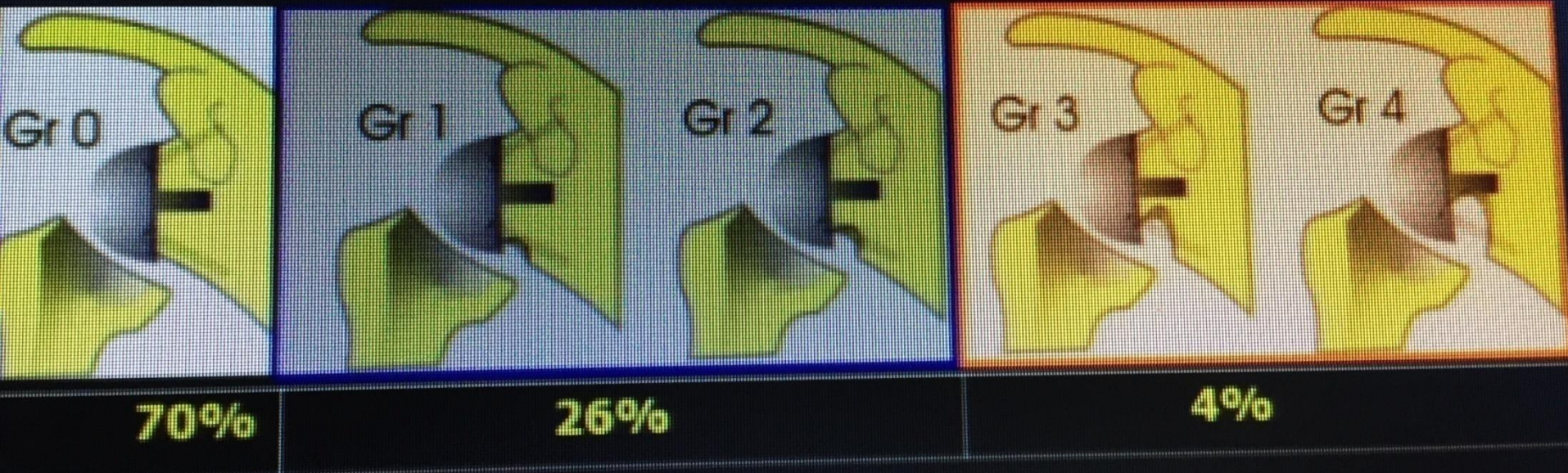
Complications of Reverse TSA

Results

- **Overall complication rate: 18.4%**
- **Primary RSA: 13.1%**
- **RSA after failed surg: 23%**
- **Revision of failed arthroplasty: 38.1%**

Complications of Reverse TSA

Scapular Notching



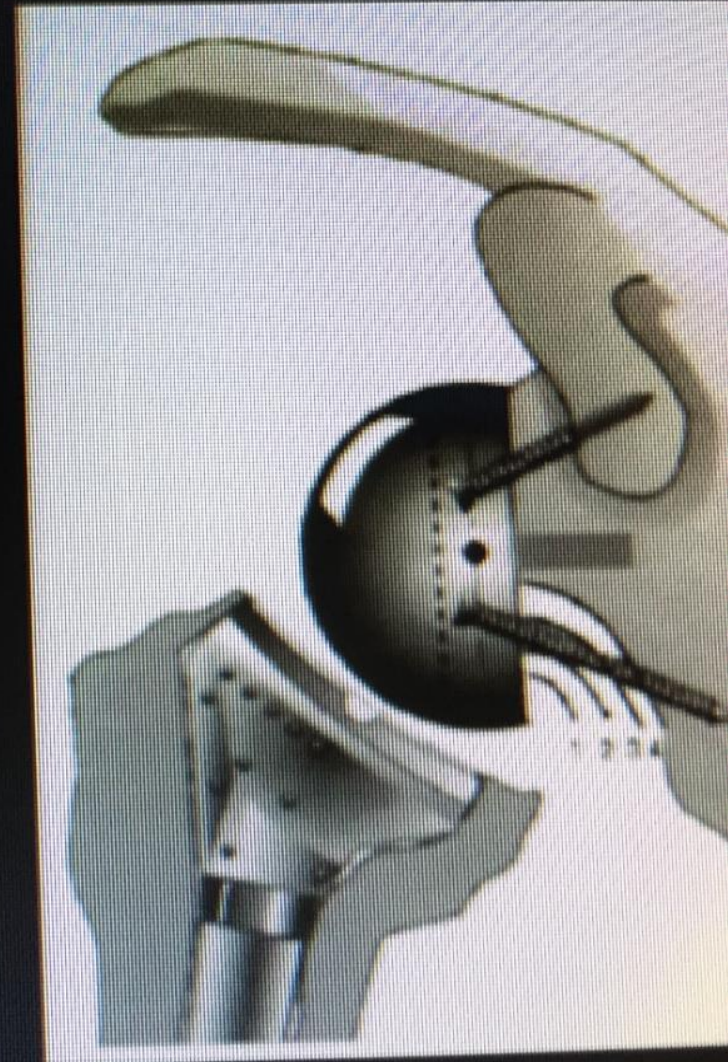
Complications of Reverse TSA

Methods

Several preoperative findings have been associated with development of notching; rotator cuff tear arthropathy, fatty infiltration of the infraspinatus, narrowed acromiohumeral distance and a superiorly oriented glenoid are risk factors for developing notching

NEROT GRADING SYSTEM

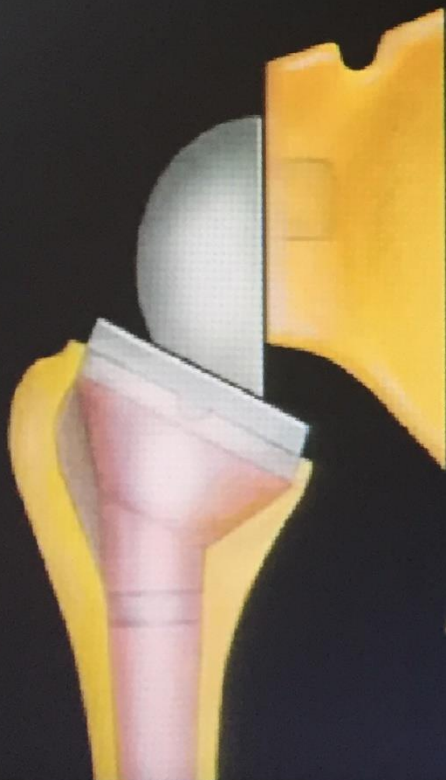
- **Grade 0: no notch**
- **Grade 1: lat pillar**
- **Grade 2: lat pillar/sclerotic**
- **Grade 3: beyond inf screw**
- **Grade 4: under baseplate**



- ▣ Operative parameters associated with notching are the anterosuperior approach, high position of the baseplate and inadequate prosthesis-scapular neck angle .
- ▣ Inferior positioning of the glenoid baseplate is probably not only imperative to obtain good range of movement but also the most important factor to prevent scapular notching

- ▣ Currently, the safest methods to prevent notching are
- ▣ inferior positioning of the glenoid baseplate
- ▣ larger size implants with shallow concave components and,
- ▣ possibly, use of a prosthetic system with less medialisation of the centre of rotation

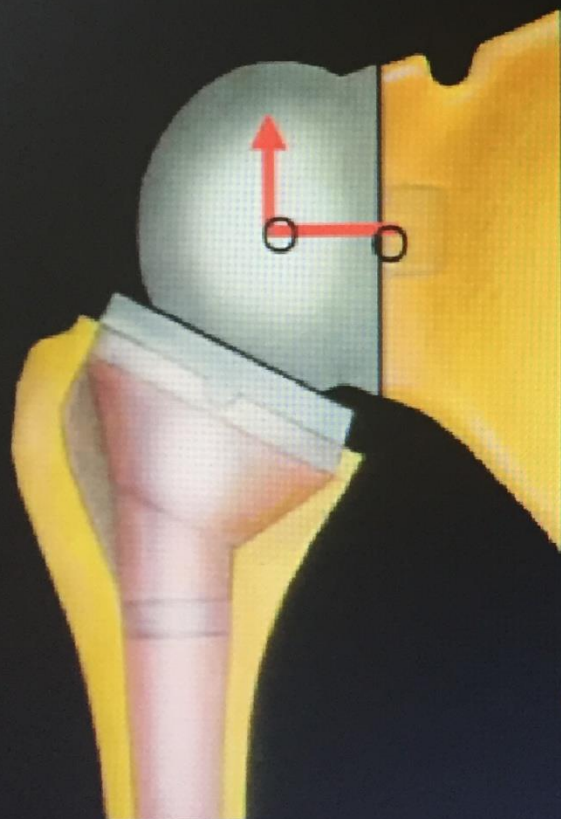
Excentric sphere
gives
inferior clearance



lateralizing the center of rotation

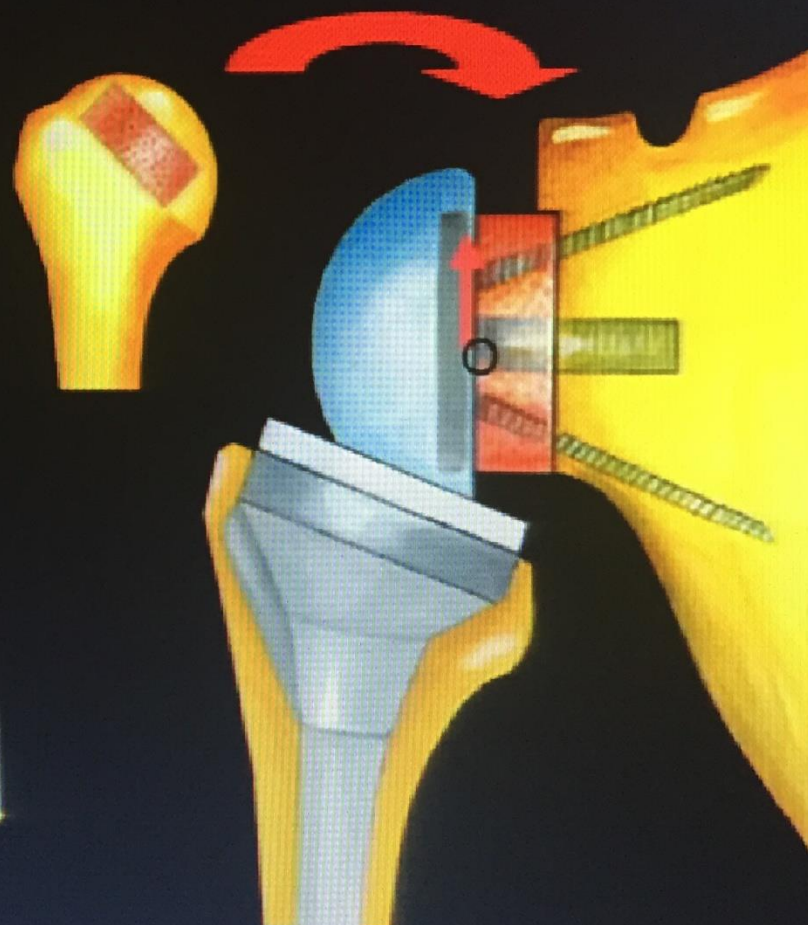
FRANKLE design

0° (?) notch at 33m

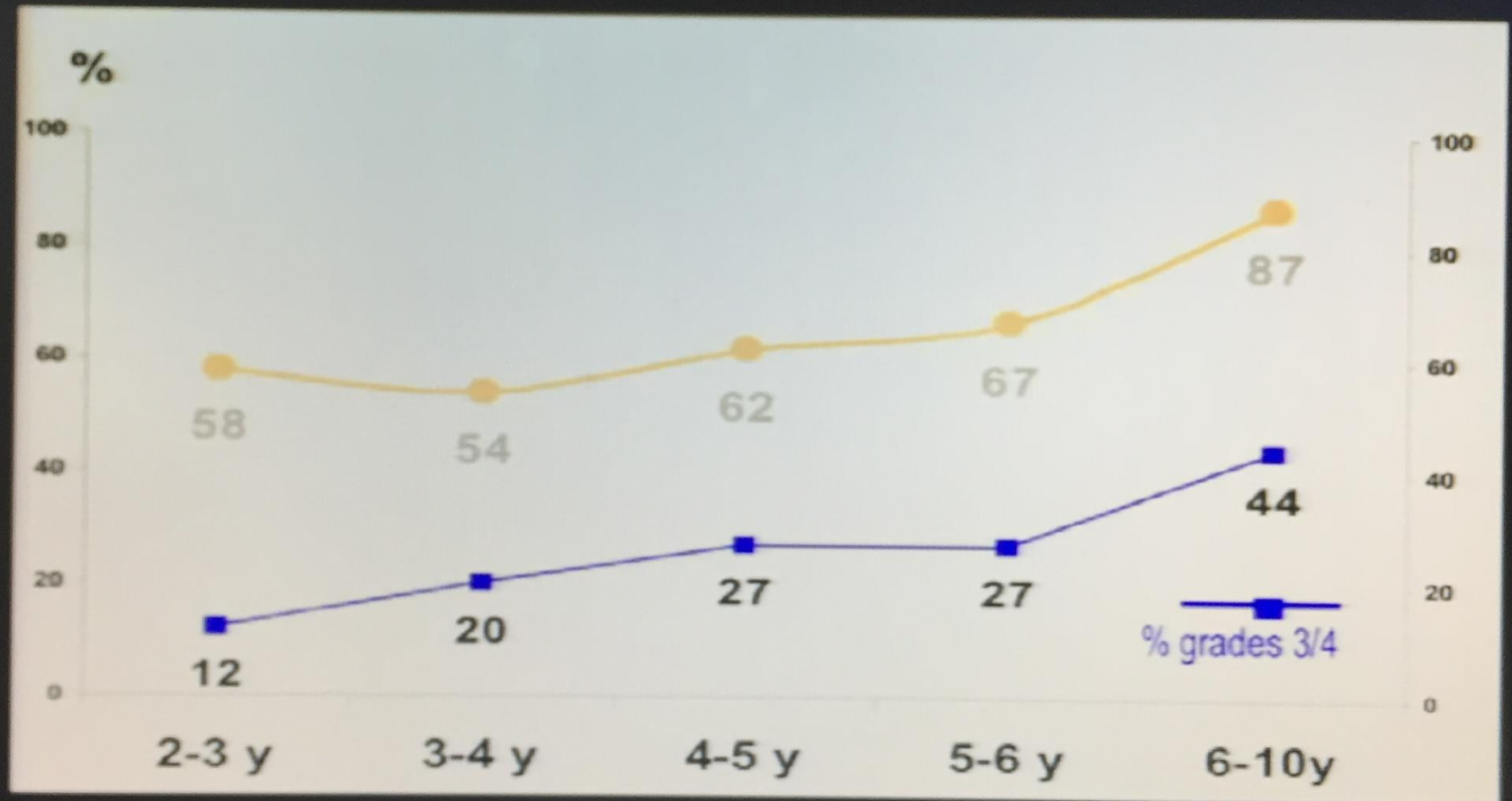


BIO RSA (Boileau)

20° notch at 40m

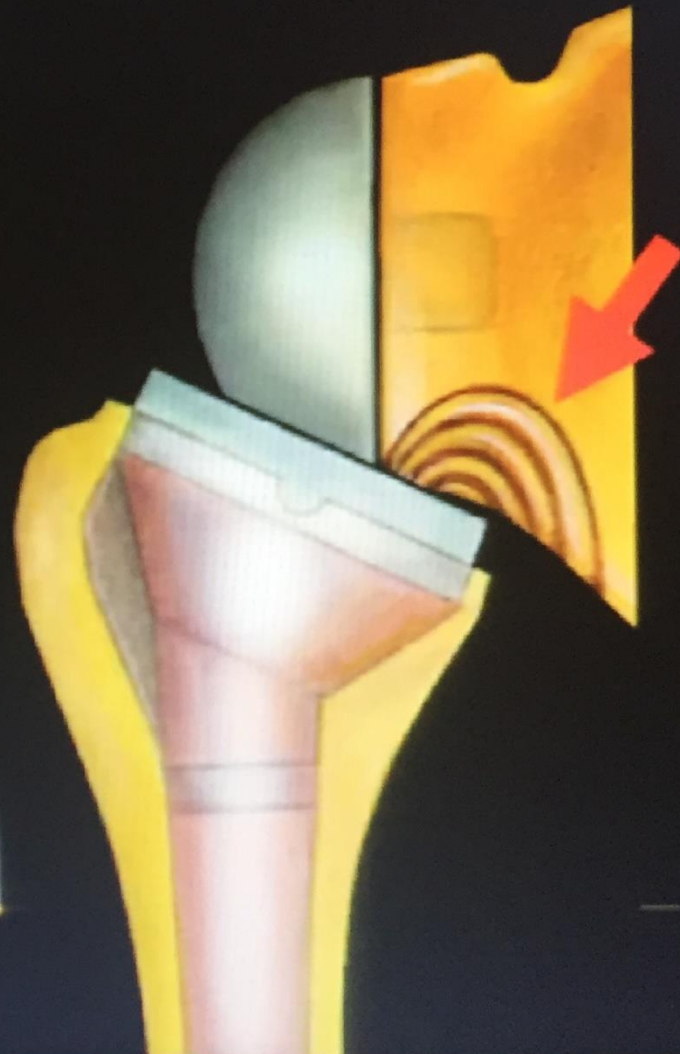


Notch appears early



- frequency increases with follow-up ($p=0.008$)
- grade increases with follow-up ($p<0.0001$)

NOTCHING: DOES IT MATTER?



no clinical consequences ... to date

no correlation with pain

no correlation with constant score

no correlation with range of motion

no correlation with glenoid loosening



Simovitch R. et al: Predictors of scapular notching in patients managed with the Delta III reverse total shoulder replacement. JBJS-A, 2007

"Inferior scapular notching was associated with a significantly poorer clinical outcome."



Glenoid component loosening

- ▣ Risk factors for glenoid loosening are **female gender, age younger than 70 years and a superolateral approach , Superior tilt**
- ▣ surgical technique of glenoid fixation play key roles. **Accurate placement of the inferior screw** in good quality bone (e.g. not excessively reamed glenoid) and **caudal positioning** have been identified as protective or advantageous with regard to primary stability and range of motion, respectively.



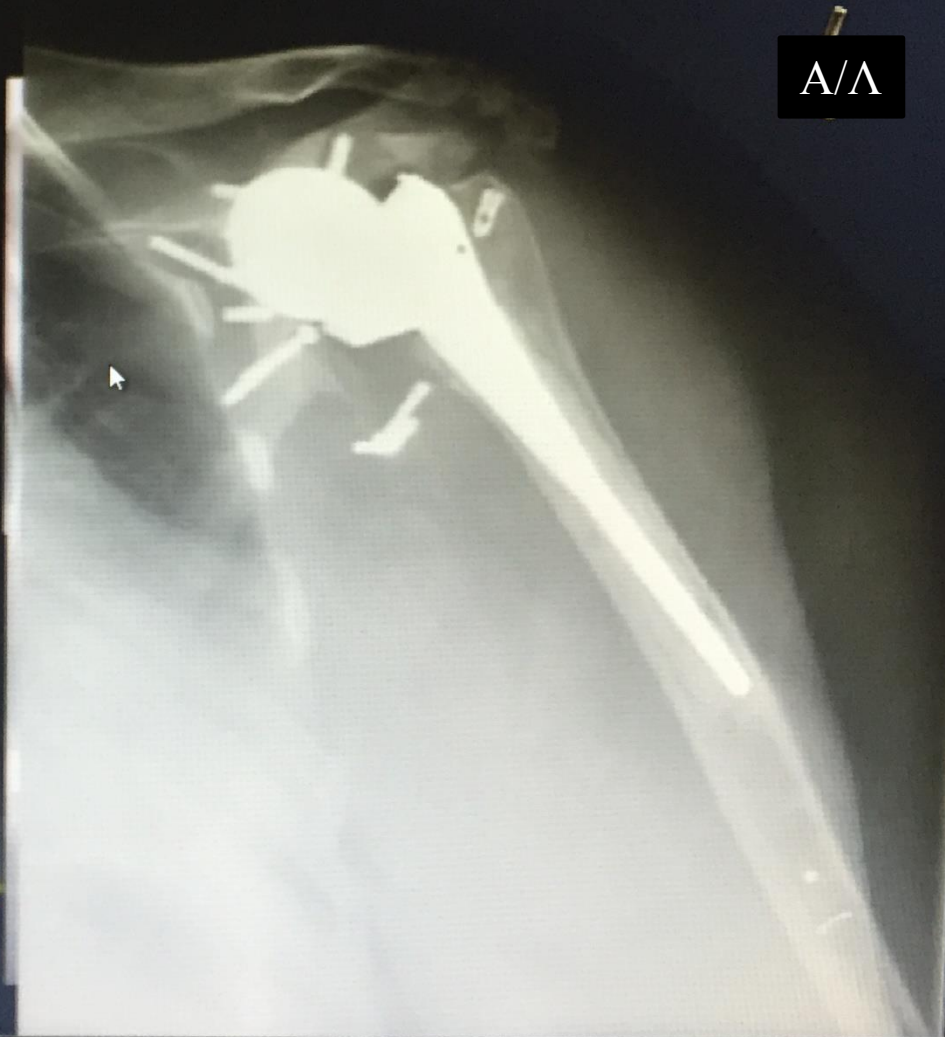
1. Hardware Failure

5.8%

90% were *REVISION* cases
1.5-2x Risk in *REVISION* cases

Literature = 7.8% Risk

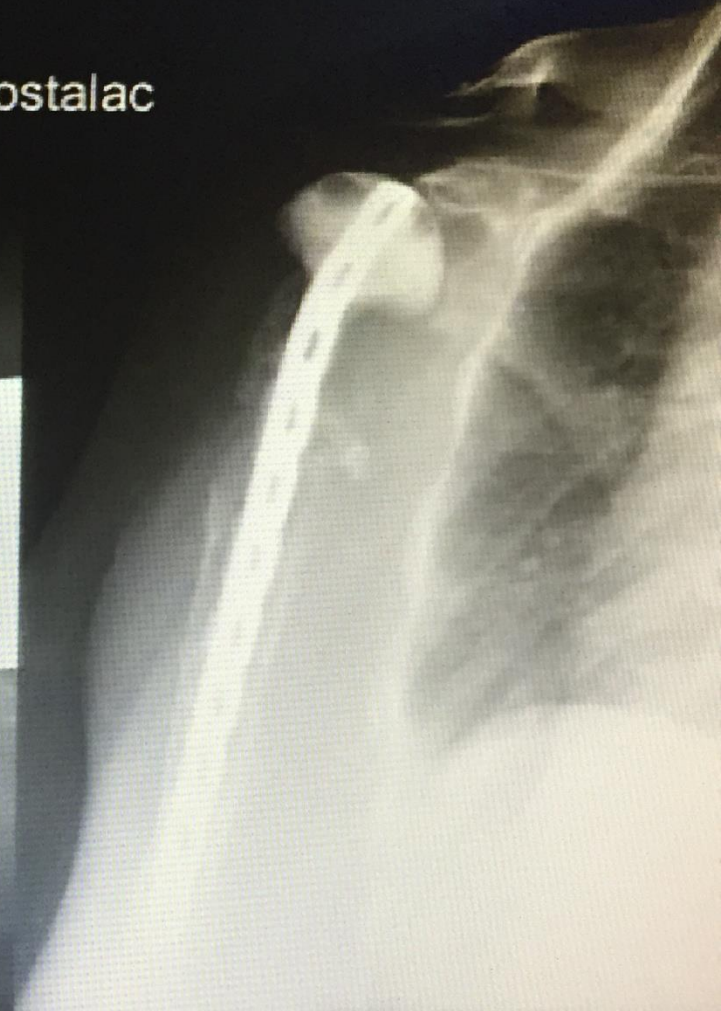
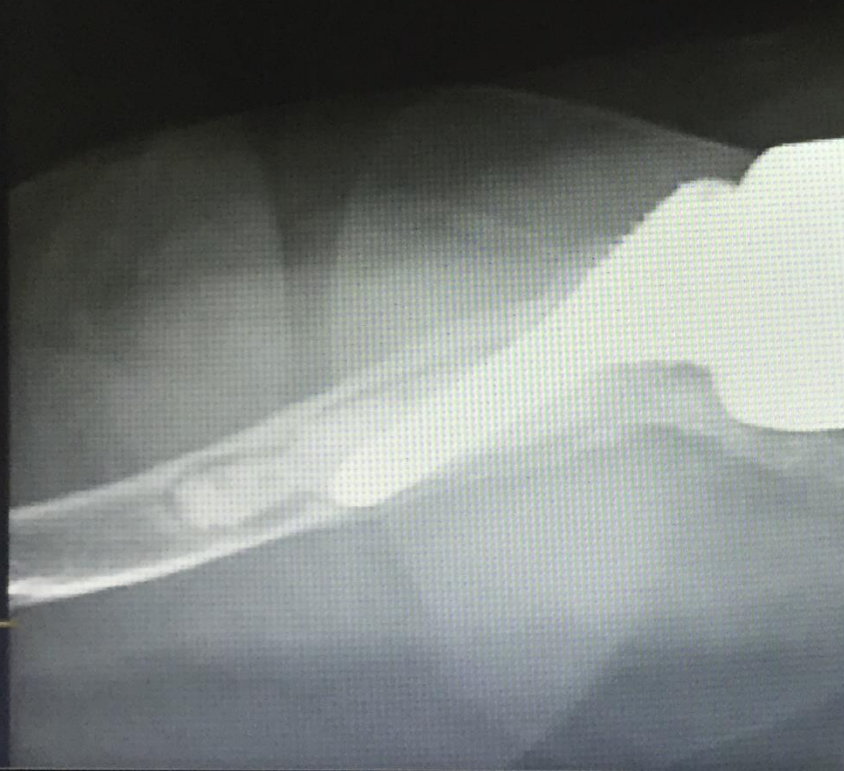
A/Λ



2. Infection

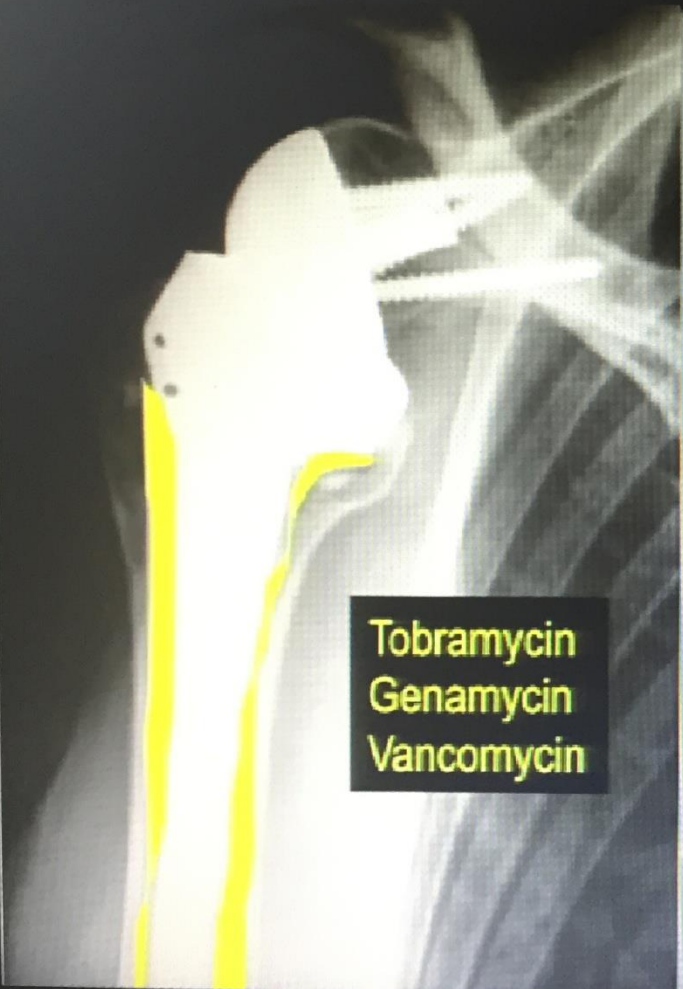
4.0%

- Primary vs Revision: 2% vs 8%
- Literature gives similar rates
- p. acnes or coag (-) staph.
- 5/6 underwent 2-stage reimplantation with Prostalac



Antibiotic-loaded bone cement reduces deep infection rates for primary reverse total shoulder arthroplasty: a retrospective, cohort study of 501 shoulders. Nowinski RJ, Gillespie RJ, Shishani Y, Cohen B, Walch G, Gobeze R. JSES 2012

Use of Antibiotics in Cement reduced infection rate to 0% from 3% without abx in cement

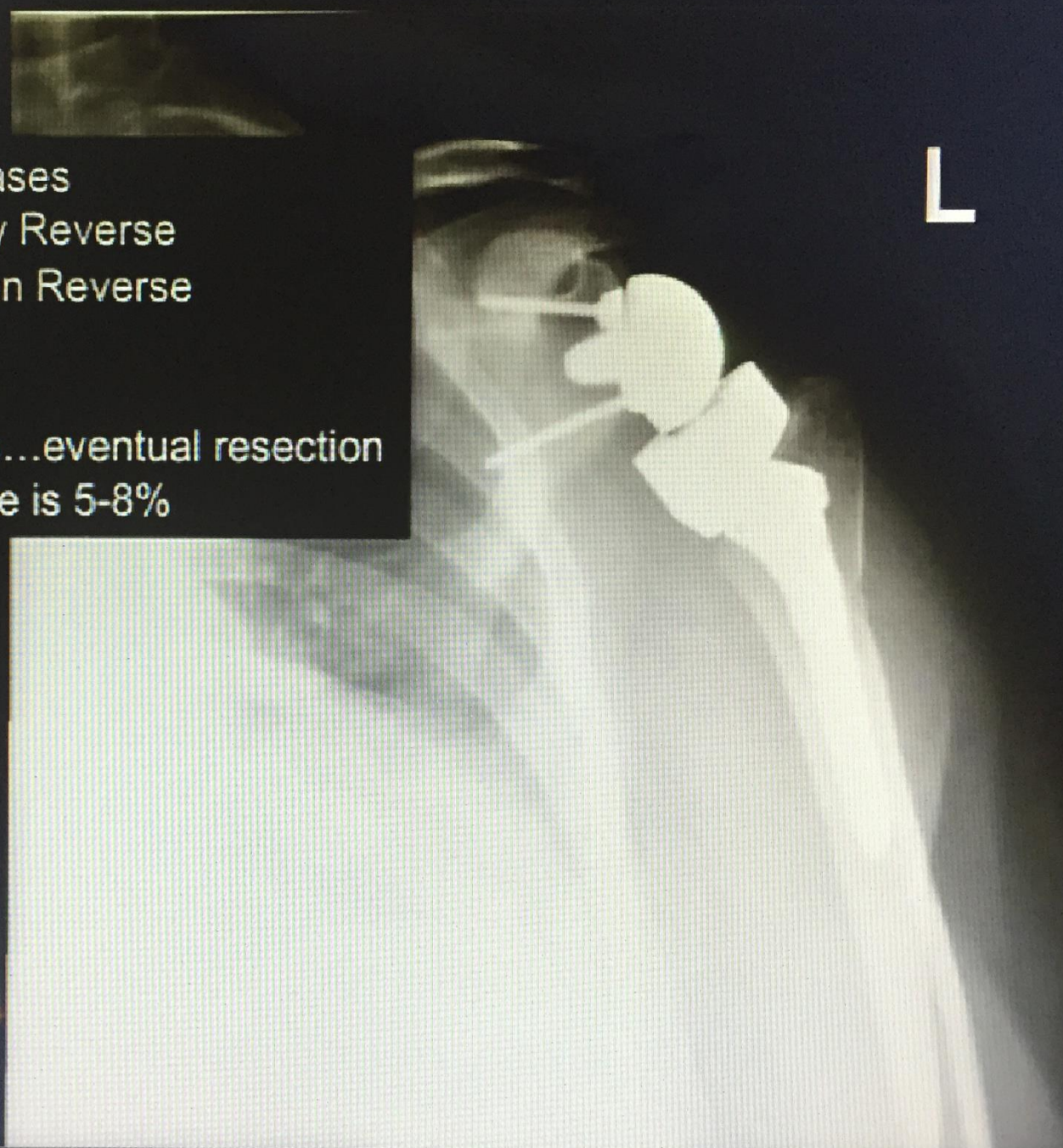


Tobramycin
Genamycin
Vancomycin

3. Instability

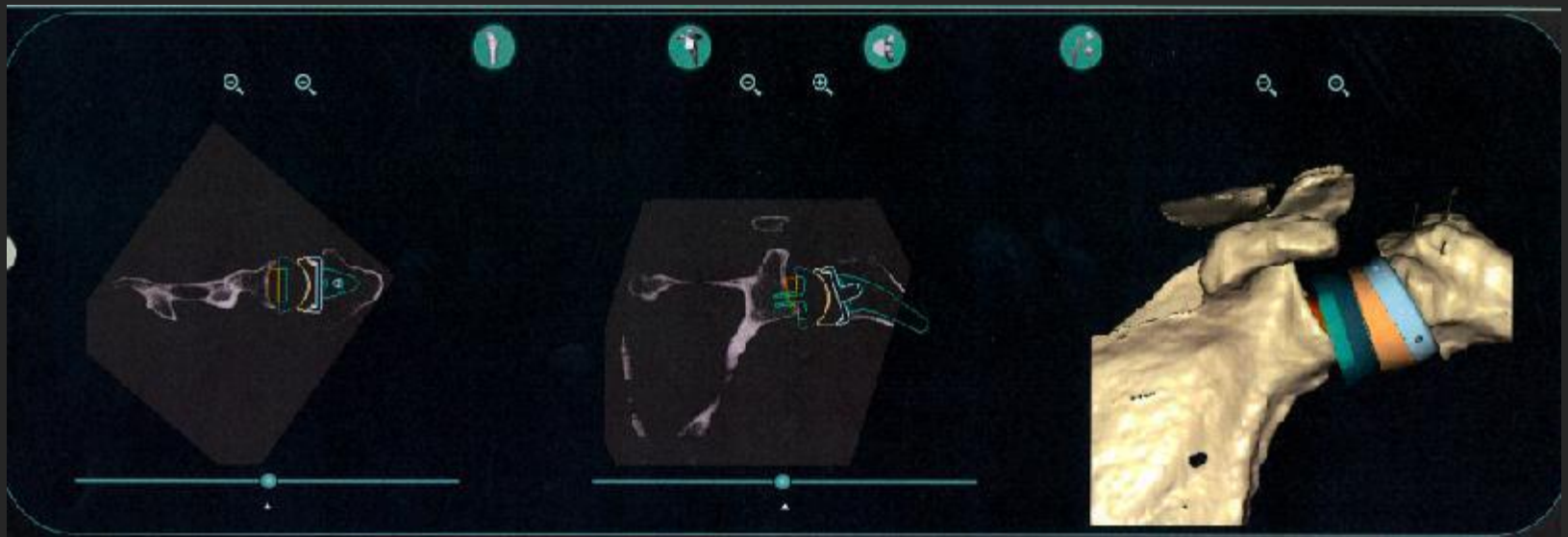
4.0%

- 5/7 Were in Revision Cases
- 2% Incidence in Primary Reverse
- 8% Incidence in Revision Reverse
- 5/7 required surgery
- 1/7 closed reduction
- 1/7 multiple dislocations...eventual resection
- Literature says incidence is 5-8%

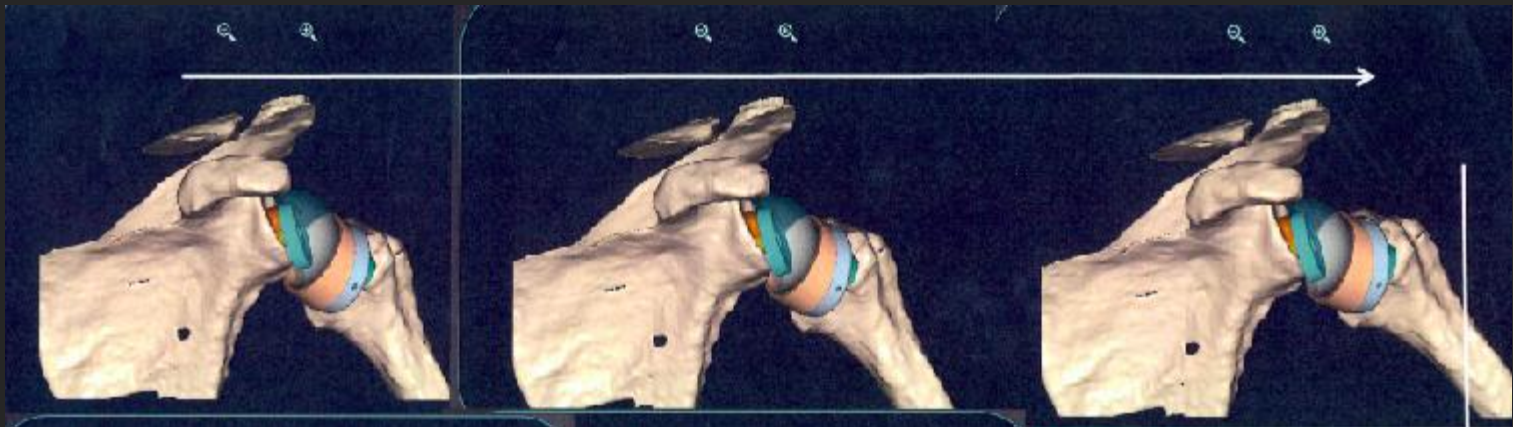


AVOIDING INSTABILITY

1. **Subscapularis Repair with Reverse:** (Edwards TB et al: Subscapularis insufficiency and the risk of shoulder dislocation after reverse shoulder arthroplasty. JSES 2009)
2. **Superior approach for placement of Reverse:** (Mole D et al: Surgical Technique: The Anterosuperior approach for Reverse shoulder arthroplasty. CORR 2011)
3. **Component Geometry and Technique:** (Favre P et al.: The Effect of Component Positioning on Intrinsic stability of the Reverse Shoulder Arthroplasty. JSES 2010)
 - Anterior stability is improved by placing the humeral component in neutral or with some antiversion



- ▣ Preoperative 3-Dimensional C.T. Scan planning allows for optimum placement Of Reverse Prosthesis to ensure for maximum stability & range of motion



Acromion/Scapular Spine Fx

2.9%

- 1.5-7% in literature
- None required surgery
- SSV same as without Fx



Nerve Injury

2.3%



How can we avoid complications ?

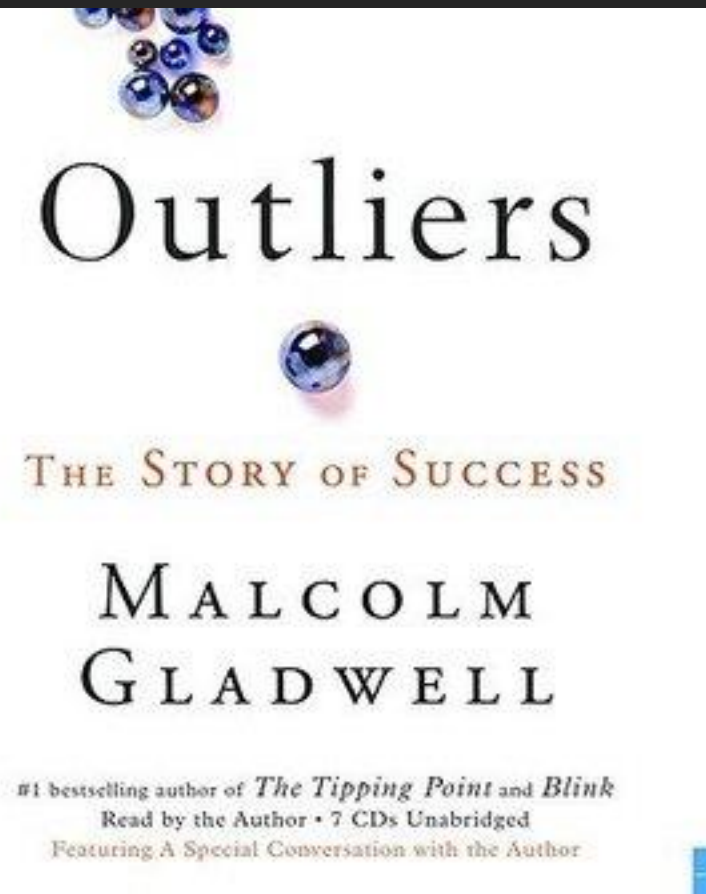


Malcolm Gladwell:

“ It takes > 10.000 hrs to become EXCELLENT “

Arnold Palmer :

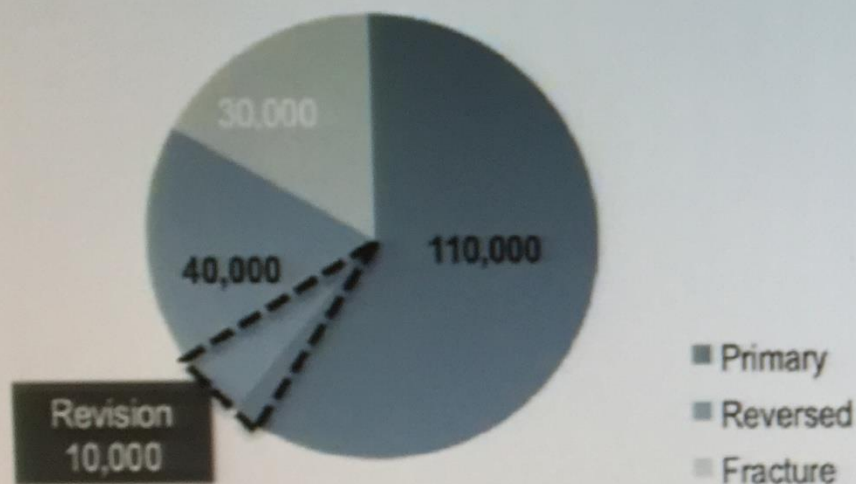
“ The most successful golfers were the result of 10% ability and 90% practice... but you have to have the 10% ”



One more complication

2011 – 2015 : MARKET EVOLUTION (UNITS)

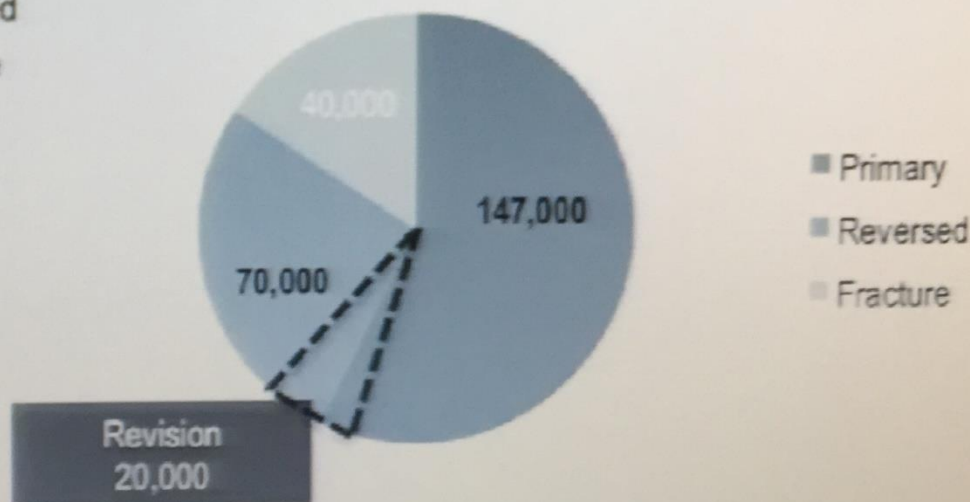
2011 WW Shoulder Arthroplasty : 180,000 units *



- Global Unit CAGR : 9.3%
- Revision CAGR: 19.7%
- Reversed CAGR: 15.0%
- Primary CAGR: 7.5%
- Fracture CAGR: 7.5%

4 YEAR GROWTH
43% OVERALL
75% REVERSE
100% REVISIONS

2015 WW Shoulder Arthroplasty : 257,000 units





DAVE GRANLUND © www.davegranlund.com

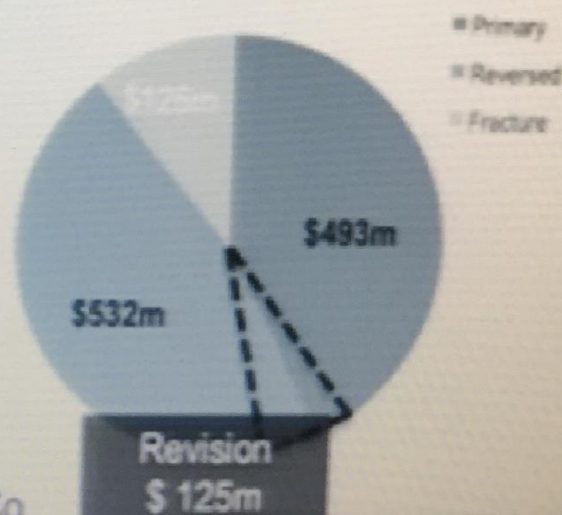
OUR MARKET: REVENUE

2011 WW Shoulder Arthroplasty : \$ 819m*



4 YEAR GROWTH
40% OVERALL
66% REVERSE
115 % REVISIONS

2015 WW Shoulder Arthroplasty : \$ 1.15b



- Global Revenue CAGR 2011 – 2015 = 9% (Units growing faster than rev)
- Revision Market CAGR : 20%
- Reversed Market CAGR : 13%
- Primary Market CAGR : 6%
- Fracture Market : 5%

Courtesy of Tornier Co.

WHAT IS THE VALUE?

4-YEAR COST AND CLINICAL OUTCOMES OF SHOULDER ARTHROPLASTY

Mark Frankle et al

ASES Closed Meeting 2012

Sea Island, Georgia

October 14, 2012; 7:40am

The average TSA episode of care cost \$17,587

The average RSA episode of care cost \$24,661

WHAT IS THE VALUE?

4-YEAR COST AND CLINICAL OUTCOMES OF SHOULDER ARTHROPLASTY

Mark Frankle et al

ASES Closed Meeting 2012

Sea Island, Georgia

October 14, 2012; 7:40am

*REVERSE PROSTHESIS IS 40% MORE
EXPENSIVE THAN TSR*

WHAT IS THE VALUE?

4-YEAR COST AND CLINICAL OUTCOMES OF SHOULDER ARTHROPLASTY

Mark Frankle et al

ASES Closed Meeting 2012

Sea Island, Georgia

October 14, 2012; 7:40am

ASES SCORE

TSA IMPROVED PATIENTS:	39	→	82
REVERSE IMPROVED PATIENTS:	40	→	79

WHAT IS THE VALUE?

4-YEAR COST AND CLINICAL OUTCOMES OF SHOULDER ARTHROPLASTY

Mark Frankle et al

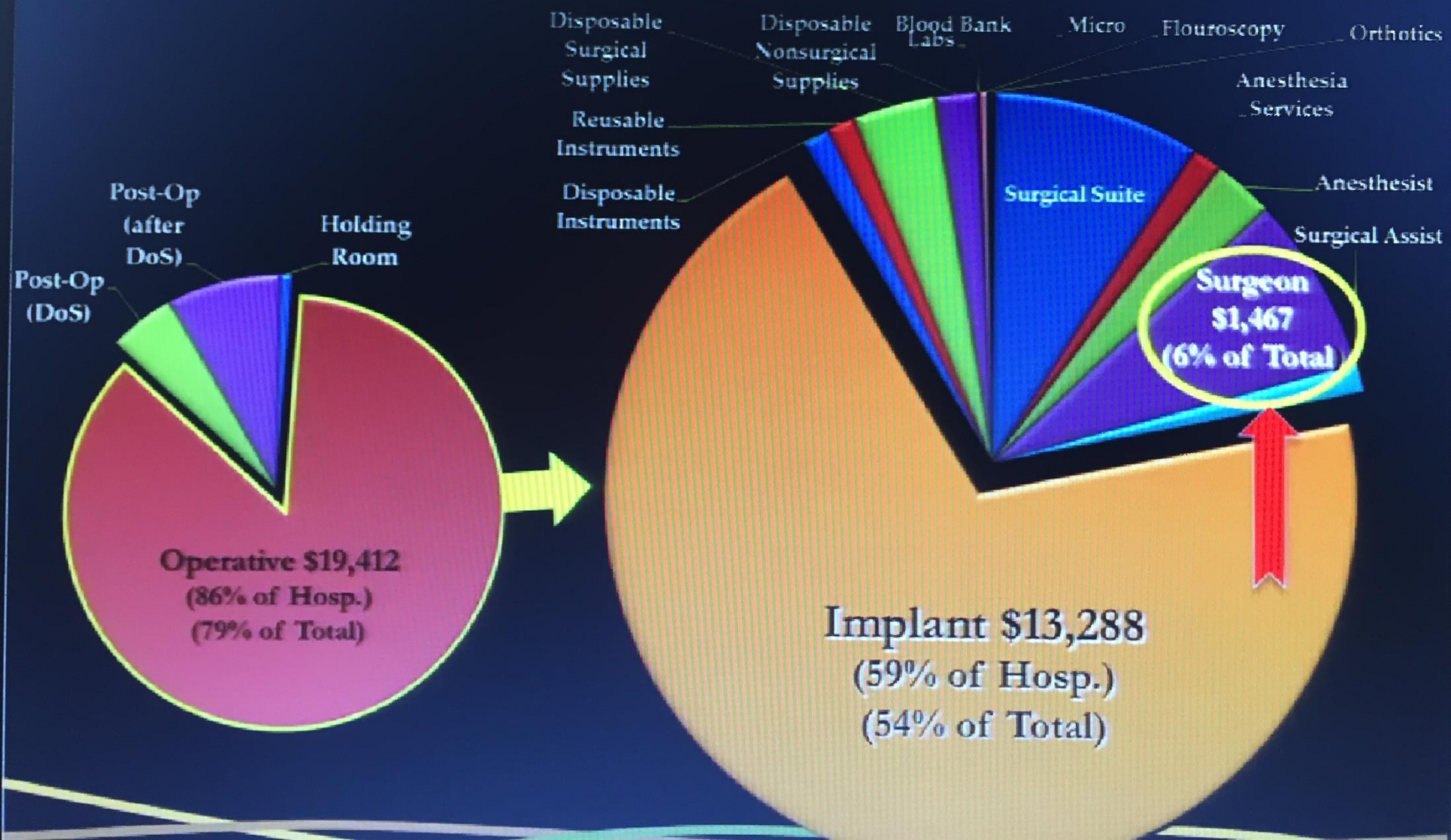
ASES Closed Meeting 2012

Sea Island, Georgia

October 14, 2012; 7:40am

*REVERSE IS 7X MORE RISKY FOR
COMPLICATION THAN TSR*

RSA: Hospitalization





Thank you