



University of California
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DAIR and 1Stage Exchange

Patient Selection and Techniques

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9/16/22

Disclosures

- Lineage Medical – content editor, investor
 - Smith & Nephew - consulting
 - Depuy – course teaching
-
- I am a junior faculty member at an academic practice....
 - Infections find me

Propensity for attracting infections

“Pus Boy”



Outline for Today

- Can less be more?
- A move away from 2-stage only
 - 1-stage vs 2-stage exchange
 - DAIR (I&D) vs 2-stage exchange for complex TKA PJI
- How to do a modern single stage procedure (for DAIR, 1Stage, or spacer)
 - Adjunctive techniques with and without proof



What defines Periprosthetic Infection: MSIS INFECTION CRITERIA

- Sinus tract communicating with the prosthesis or Positive Culture on 2 separate tissues or fluid samples or
- Three of the following 5 criteria exist
 - ESR > 30 + CRP > 10
 - Synovial WBC > 2000
 - Synovial PMN's > 75%
 - One positive culture
 - > 5 Neutrophils in 5 high power histologic fields



2018 “Parvizi” Criteria

J. Parvizi et al. / The Journal of Arthroplasty 33 (2018) 1309–1314

Major criteria (at least one of the following)	Decision
Two positive cultures of the same organism	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

Preoperative Diagnosis	Minor Criteria		Score	Decision
	Serum	Elevated CRP <u>or</u> D-Dimer	2	≥6 Infected
		Elevated ESR	1	
	Synovial	Elevated synovial WBC count <u>or</u> LE	3	2-5 Possibly Infected ^a
		Positive alpha-defensin	3	
		Elevated synovial PMN (%)	2	
		Elevated synovial CRP	1	
				0-1 Not Infected

Intraoperative Diagnosis	Inconclusive pre-op score <u>or</u> dry tap ^a		Score	Decision
	Preoperative score		-	≥6 Infected
	Positive histology		3	4-5 Inconclusive ^b
	Positive purulence		3	
	Single positive culture		2	≤3 Not Infected

Important updated cutoffs:

Table 4
Proposed Thresholds Based on the 2013 ICM Combined With Current Findings.

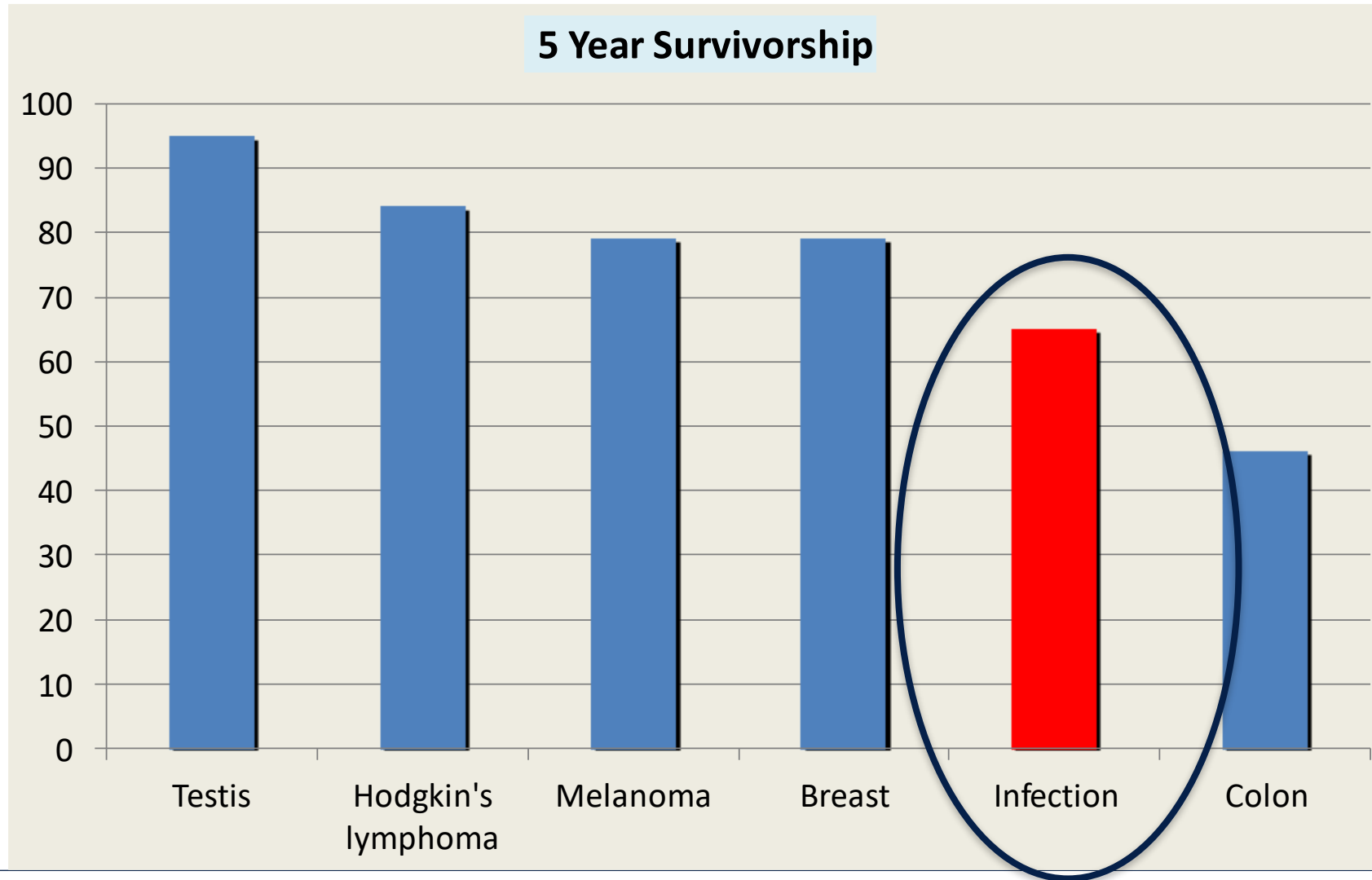
Marker	Chronic (>90 d)	Acute (<90 d)
Serum CRP (mg/dL)	1.0	10
Serum D-dimer (ng/mL)	860	860 ^a
Serum ESR (mm/h)	30	-
Synovial WBC count (cells/μL)	3000	10,000
Synovial PMN (%)	80	90
Synovial CRP (mg/L)	6.9 ^a	6.9
Synovial alpha-defensin (signal-to-cutoff ratio)	1.0	1.0

CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; ICM, International Consensus Meeting; PMN, polymorphonuclear; WBC, white blood cell.

^a Further studies are needed to validate a specific threshold.

One or more of the authors of this paper have disclosed potential or pertinent conflicts of interest, which may include receipt of payment, either direct or indirect, institutional support, or association with an entity in the biomedical field which may be perceived to have potential conflict of interest with this work. For full disclosure statements refer to <https://doi.org/10.1016/j.arth.2018.02.078>.

Periprosthetic Joint Infection worse than many Cancers



2 Stage - Historically Good Results

Two-Stage Reimplantation for Periprosthetic Knee Infection Involving Resistant Organisms

J Bone Joint Surg 89-A, June, 2007

By Yogesh Mittal, MD, Thomas K. Fehring, MD, Arlen Hanssen, MD,
Camelia Marculescu, MD, Susan M. Odum, MEd, and Douglas Osmon, MD

86% Success Rate

Long-Term Results of a 2-Stage Exchange Protocol for Periprosthetic Joint Infection Following Total Hip Arthroplasty in 164 Hips

THE JOURNAL OF BONE & JOINT SURGERY • JBJS.ORG
VOLUME 101-A • NUMBER 1 • JANUARY 2, 2019

Stephen M. Petis, MD, FRCSC, Matthew P. Abdel, MD, Kevin I. Perry, MD, Tad M. Mabry, MD, Arlen D. Hanssen, MD, and
Daniel J. Berry, MD

85% success at mean 12 year f/u

Generally accepted 80-90% success of 2-stage exchange arthroplasty**

Morbidity of 2-Stage Exchange

3months (minimum) limited functional ability

- Restricted WB
- Articulating spacers better

Physiologic stress of two big procedures in often frail patients

- Replant higher EBL than other revision diagnoses (Goel JoA 2018)

Falling through the cracks

- Retained spacers (5-15% reported)
- Mortality after 1st stage
- Depression/anxiety of PJI – equivalent to oncologic diagnosis (Walter 2021)

Could we get as good of results with less?

- What about a 1-stage exchange?
- Already using “real implants” in spacers



EUROPEAN ONE STAGE STUDIES

Single-Stage Hip and Knee Exchange for Periprosthetic Joint Infection

David A. George, MBChB, BMedSc, MRCS (Eng)^a, Sujith Konan, MBBS, MD (Res), FRCS (Orth)^a,
Fares S. Haddad, MD (Res), FRCS (Orth), FFSEM^{a,b,c}

^a Department of Trauma and Orthopaedic Surgery, University College London Hospitals, London, UK

^b The Princess Grace Hospital, London, UK

^c Institute of Sport, Exercise and Health, University College London, London, UK

The Journal of Arthroplasty 30 (2015) 2264–2270

- 100% Success rate
- 11 Periprosthetic Hip Infections
- 28 Periprosthetic Knee infections
- 5 year f/u
- Exclusion criteria
 - Significant comorbidities
 - Resistant organisms
 - Presence of sinus tract
 - Peripheral Vascular disease



EUROPEAN ONE STAGE STUDIES

Clin Orthop Relat Res (2016) 474:81–87
DOI 10.1007/s11999-015-4408-5

Clinical Orthopaedics
and Related Research®
A Publication of The Association of Bone and Joint Surgeons®



SYMPOSIUM: 2015 KNEE SOCIETY PROCEEDINGS

Can Good Infection Control Be Obtained in One-stage Exchange of the Infected TKA to a Rotating Hinge Design? 10-year Results

Akos Zahar MD, Daniel O. Kendoff MD, PhD, Till O. Klatte MD,
Thorsten A. Gehrke MD

- 70 patients minimum 9 year f/u
 - All comers unless unknown organism preop
 - Radical resection of bone and capsule/ligaments
 - Hinged implants used exclusively - 93% infection free
 - 16% lost to f/u
 - 16% loose implants
- ↔ 32%



WHAT DO WE DO FOR THESE?



Need a prospective randomized multicenter study of all comers*

*Not revision, not immunocompromised, not fungal...

- Prospective randomized multicenter study One stage vs. Two stage treatment for Periprosthetic hip & knee infections



ONE STAGE vs. TWO STAGE STUDY

Inclusion Criteria

- Primary TJA infection
- Infection/MSIS criteria
- **Known organism**
- Resistant organisms
- Previous I & D ok

- Reprep/Redrape Protocol *
- All hosts classified / MSIS criteria
- Powered at 305 patients (met numbers)
- Prolonged post-op abx protocol

Exclusion Criteria

- Fungal Infection
- Immunosuppressed patients
- Extensive soft tissue defect
- Revision surgery

**Cant share specifics but
encouraging early results in both
groups!**

> Hip Int. 2021 Feb 18;1120700021991467. doi: 10.1177/1120700021991467. Online ahead of print.

High re-revision rate following one-stage exchange for streptococcal periprosthetic joint infection of the hip

Malte Ohlmeier¹, Insa Jachczik¹, Mustafa Citak¹, Thorsten Gehrke¹, Nael Hawi², Carl Haasper³, Hussein Abdelaziz¹

Affiliations – collapse

Affiliations

- ¹ Department of Joint Surgery, Helios ENDO-Klinik Hamburg, Hamburg, Germany.
- ² Department of Trauma, Hannover Medical School, Hannover, Germany.
- ³ Department of Orthopaedic Surgery, AMEOS Klinikum Seepark, Geestland, Germany.

- 30 patients average 8yr f/u after 1stage exchange for strep PJI
 - 50% revision rate at average 5 years
 - 20% reinfection same organism

Complications - Infection

The Journal of Arthroplasty 36 (2021) 711–716

High Rate of Reinfection With New Bacteria Following One-Stage Exchange for Enterococcal Periprosthetic Infection of the Knee: A Single-Center Study

Markus Rossmann, MD^a, Thore Minde, MD^a, Mustafa Citak, MD, PhD^a, Thorsten Gehrke, MD^a, Nemandra A. Sandiford, MD^b, Till Orla Klatte, MD, PhD^c, Hussein Abdelaziz, MD^{a,*}

^a Department of Joint Replacement Surgery, Helios ENDO-Klinik Hamburg, Hamburg, Germany

^b Complex Arthroplasty Unit, St George's Hospital, London, United Kingdom

^c Department of Trauma, Hand, and Reconstructive Surgery, University Medical Center Hamburg-Eppendorf, Hamburg, Germany

- 40 patients average 6yr f/u after 1stage exchange for enterococcus PJI
 - 55% revision rate average 2yrs postop
 - 37.5% reinfection rate – majority different organism

Clin Orthop Relat Res (2019) 477:2258–2263
DOI 10.1097/CORR.0000000000000780

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and Related Research®
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Clinical Research

What are the Factors Associated with Re-revision After One-stage Revision for Periprosthetic Joint Infection of the Hip? A Case-control Study

Hussein Abdelaziz MD, Hendrik Grüber MD, Prof. Thorsten Gehrke MD, Jochen Salber MD, PhD, Mustafa Citak MD, PhD

- Persistent drainage and prior infection assoc with failure

Future problems... payers need to catch up

- Pus doesn't pay
- Academic centers bear the brunt of the burden

Complications - Infection

One-Stage Periprosthetic Joint Infection Reimbursement—Is It Worth The Effort?

Keith A. Fehring, MD^{*}, Brian M. Curtin, MD, Bryan D. Springer, MD, Thomas K. Fehring, MD

	Primary TJA			1 Stage Exchange		
	Time	Reimbursed	\$/hr	Time	Reimbursed	\$/hr
THA	104min	\$2754	<u>\$1589/hr</u>	311min	\$2826	<u>\$545/hr</u>
TKA	100min	\$2435	<u>\$1461/hr</u>	259min	\$2597	<u>\$601/hr</u>

1-Stage in my practice

- Only offer if enrolling in study
 - Not enough data otherwise to justify in my mind yet
- “pseudo” 1-stages (1.5 stage coined by Duke group) can walk around on spacers....
- Arguments that don't work for me
 - “Well,.. patient really doesn't want to do a 2 stage”
 - No one wants a 2 stage...
 - “Patient was really sick so don't think they could tolerate a 2 stage”
 - 1 stage bigger more involved procedure with potentially higher risk of failure
 - This what RCT is for

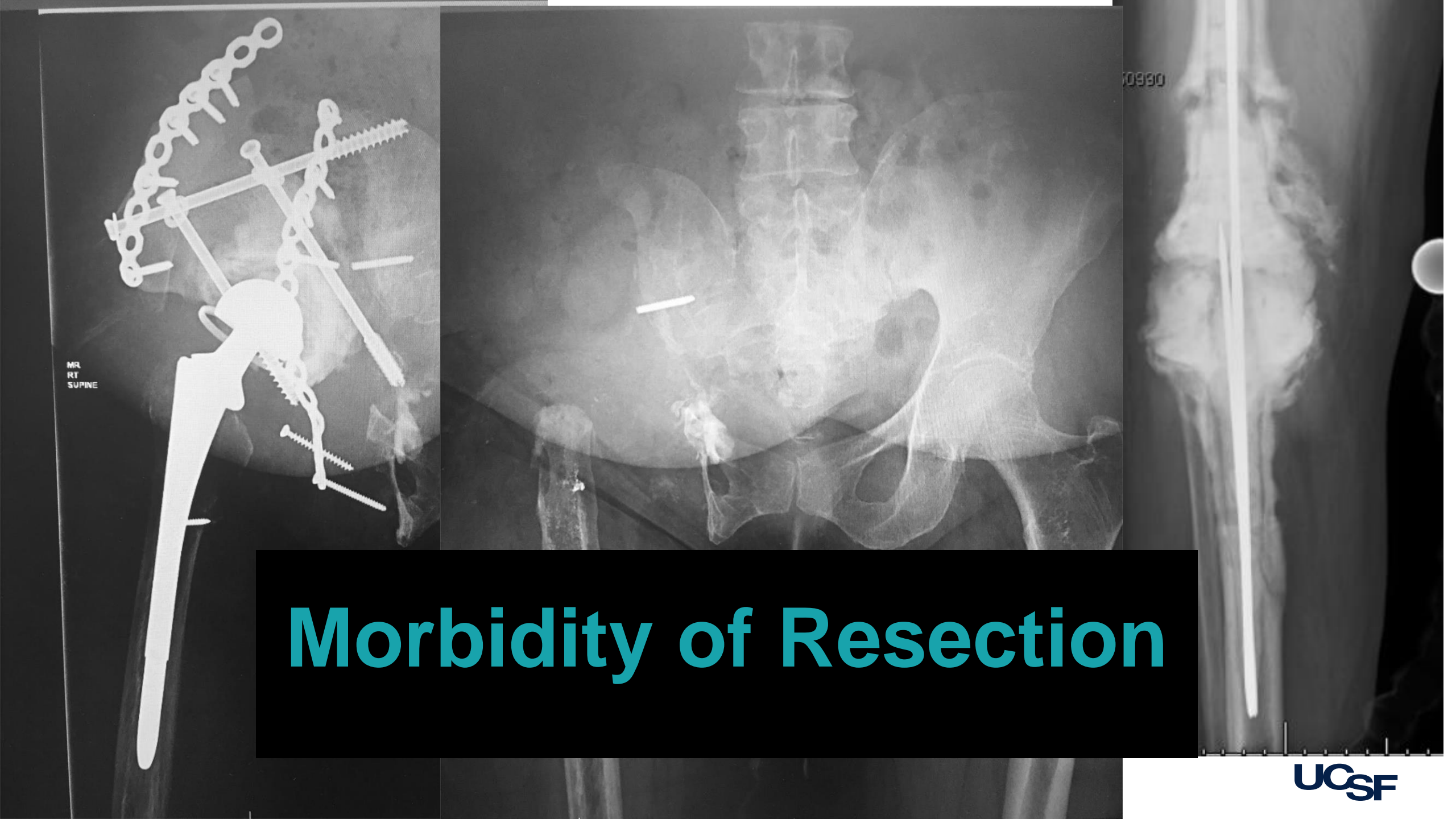


Not All Things (Knees) Are Equal



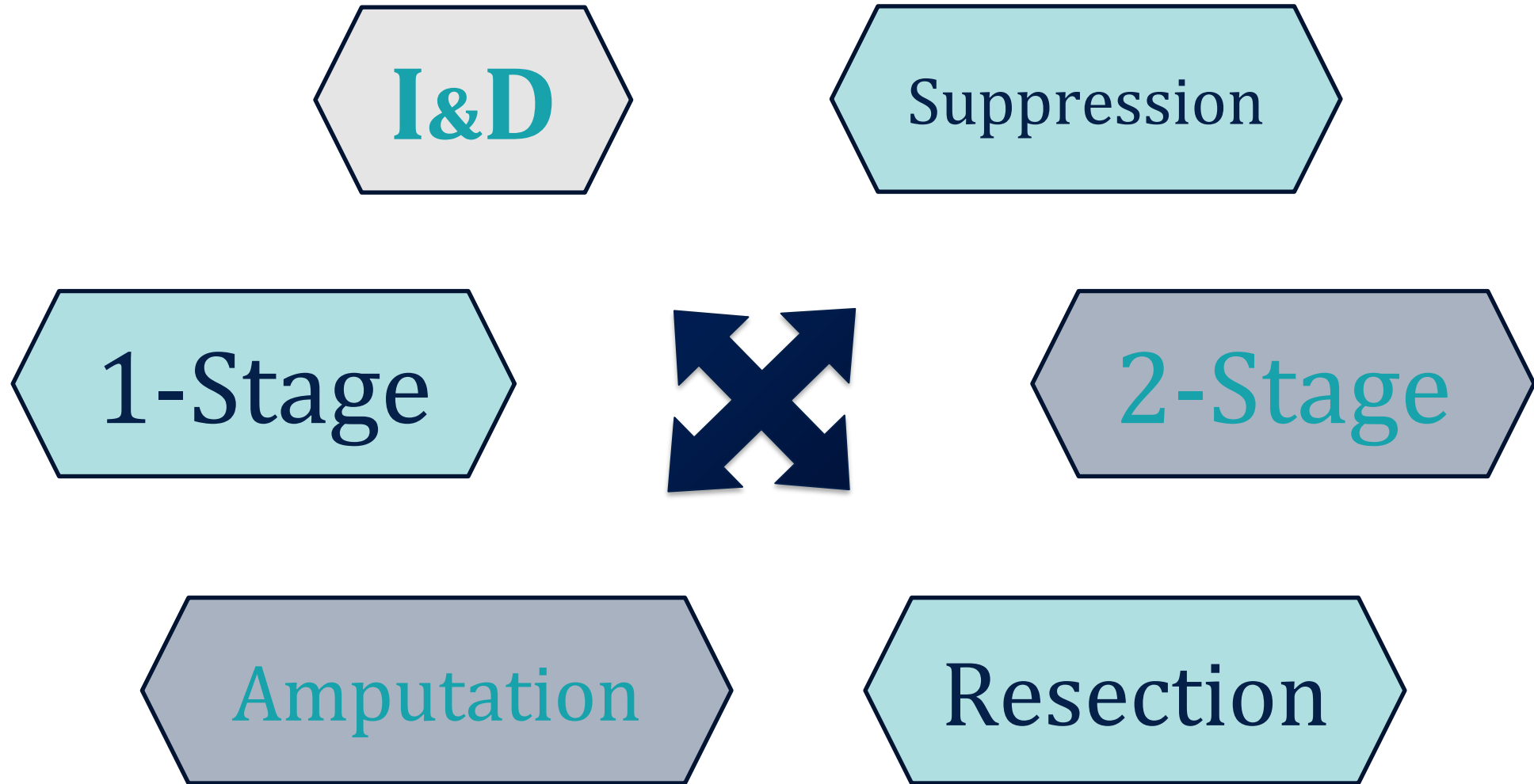
Not All Things (Knees) Are Equal





Morbidity of Resection

Where does I&D belong ?



Historical Overuse of I&D in Arthroplasty

Periprosthetic Knee Sepsis The Role of Irrigation and Debridement

MARK B. HARTMAN, M.D., THOMAS K. FEHRING, M.D.,
LINDA JORDAN, M.S., AND H. JAMES NORTON, PH.D.

Reinfection Rate – 61%

Irrigation and Debridement for Periprosthetic Infections

Does the Organism Matter?

Susan M. Odum, MEd,* Thomas K. Fehring, MD,†† Adolph V. Lombardi, MD, §
Ben M. Zmistowski, BS,|| Nicholas M. Brown, BS,¶ Jeffrey T. Luna, MD, #
Keith A. Fehring, MD,**¹ and Erik N. Hansen, MD††¹
and The Periprosthetic Infection Consortium¹

Strep Failed - 71%
Other Organisms - 67%

The Fate of Acute Methicillin-Resistant *Staphylococcus aureus* Periprosthetic Knee Infections Treated by Open Debridement and Retention of Components

Thomas Bradbury, MD,* Thomas K. Fehring, MD,† Michael Taunton, MD,‡
Arlen Hanssen, MD,‡ Khalid Azzam, MD,‡ Javad Parvizi, MD, §
and Susan M. Odum, MEd||

Failure – 84%

Failure of Irrigation and Débridement for Early Postoperative Periprosthetic Infection

Thomas K. Fehring MD, Susan M. Odum MEd, Keith R. Berend MD,
William A. Jiranek MD, Javad Parvizi MD, Kevin J. Bozic MD,
Craig J. Della Valle MD, Terence J. Gloe MD

64%

I&D hired a new marketing team

DAIR – Debridement, Antibiotics and Implant Retention



Complications - Infection

Acceptable Success Rate in Patients With Periprosthetic Knee Joint Infection Treated With Debridement, Antibiotics, and Implant Retention

Casper S. Ottesen, MD ^{*}, Anders Troelsen, MD, DMSc, PhD, Håkon Sandholdt, Steffen Jacobsen, MD, DMSc, PhD, Henrik Husted, MD, DMSc, PhD, Kirill Gromov, MD, PhD

Department of Orthopedic Surgery, Copenhagen University Hospital, Copenhagen, Denmark

C.S. Ottesen et al. / The Journal of Arthroplasty 34 (2019) 365–368

90% success for acute (<90days)

60% success for chronic infections

Debridement, antibiotics and implant retention for periprosthetic joint infections: A systematic review and meta-analysis of treatment outcomes

Setor K. Kunutsor^{a,b,*}, Andrew D. Beswick^b, Michael R. Whitehouse^{a,b}, Vikki Wylde^{a,b}, Ashley W. Blom^{a,b}

Journal of Infection 77 (2018) 479–488

11-100% success....

Hip and Knee Section, Treatment, Debridement and Retention of Implant: Proceedings of International Consensus on Orthopedic Infections

Jean Noël Argenson¹, Marius Arndt¹², George Babis¹, Andrew Battenberg², Nicolaas Budhiparama², Fabio Catani³, Foster Chen⁴, Brian de Beaubien⁵, Ayman Ebied⁶, Silvano Esposito⁷, Christopher Ferry⁵, Henry Flores³, Andrea Giorgini³, Erik Hansen⁸, K.D. Hernugrahanto², Choe Hyonmin⁶, Tae-Kyun Kim⁹, In Jun Koh⁹, Georgios Komnos¹⁰, Christian Lausmann¹², Jeremy Loloi⁵, Jaime Lora-Tamayo^{11,12}, I. Lumban-Gaol², F. Mahyudin², Mikel Mancheno-Losa^{11,12}, Camelia Marculescu⁹, Sameh Marei⁶, Kimberly E. Martin⁵, Prashant Meshram⁹, Wayne G. Paprosky⁴, Lazaros Poultsides³, Arjun Saxena³, Evan Schwechter⁴, Jay Shah⁸, Noam Shohat⁶, Rafael J. Sierra¹, Alex Soriano¹³, Anna Stefánsdóttir¹⁰, Linda I. Suleiman⁴, Adrian Taylor⁹, Georgios K. Triantafyllopoulos³, Dwikora Novembri Utomo², David Warren¹², Leo Whiteside⁵, Marjan Wouthuyzen-Bakker^{6,13,14}, Jean Yombi¹⁴, Benjamin Zmistowski¹¹

The Journal of Arthroplasty 34 (2019) S399–S419

Consensus DAIR reasonable choice for acute infections

Inconclusive on number to attempt, duration of antibiotics, type of antibiotics

Walking Tightrope

1 or 2-STAGE

(+)? Higher cure rate

(+) No chronic antibiotics

(-) Morbidity of resection and replantation

Goal = cure



DAIR

(+) Less physiologically demanding

(+) Less morbid recovery

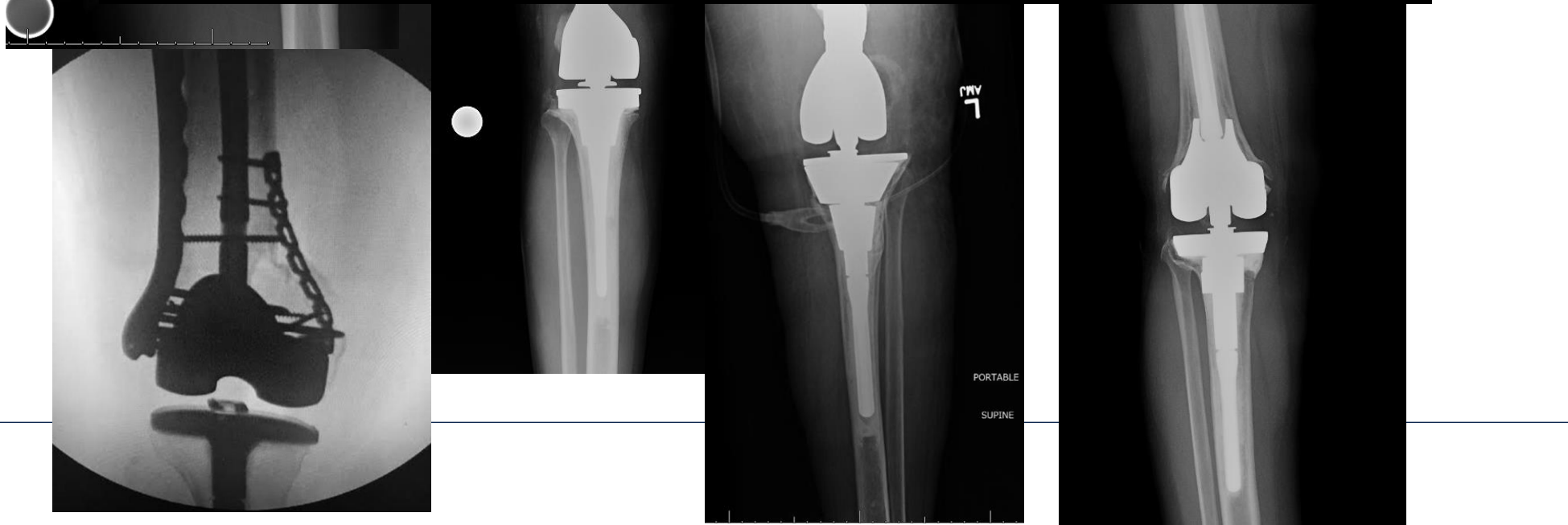
(-)? Lower cure rate

(-) biofilm remains

Goal = control and suppression



“Too Big to Fail?”



Irrigation and Debridement with Chronic Antibiotic Suppression Is as Effective as 2-Stage Exchange in Revision Total Knee Arthroplasty with Extensive Instrumentation



J Bone Joint Surg Am. 2021;103:53-63



Jeffrey J. Barry, MD, Michael B. Geary, MD, Aldo M. Riesgo, MD, Susan M. Odum, PhD, Thomas K. Fehring, MD, and Bryan D. Springer, MD

Are periprosthetic joint infections of TKAs with extensive hardware better treated with 2-stage exchange arthroplasty or I&D with modular component exchange

- Reoperations for infection
- Mortality
- Functional outcomes



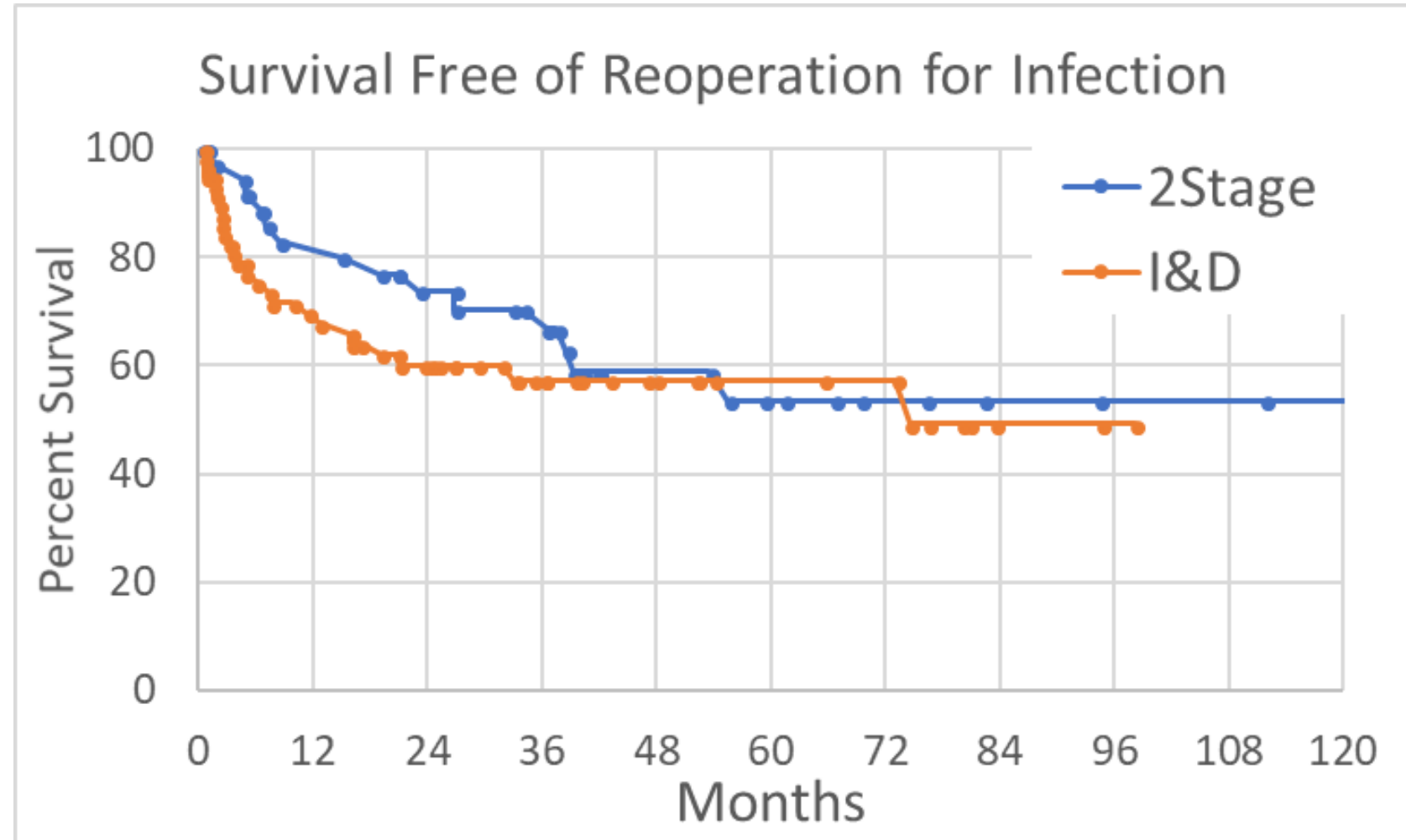
“Extensive” Hardware derivative of unresectable or maybe shouldn't be resectable

Must have at least 1 of following:

- Megaprotheses/distal femoral replacements
- Metaphyseal Cones or Sleeves
- Cemented stems >75mm
- Periprosthetic fracture hardware



- 2 year:
 - 74% Two-stage
 - 60% I&D
- 5 year:
 - 53% Two-Stage
 - 57% I&D



No Difference in Survival Free of Reoperation for Infection

Morbidity – Ambulatory at Last Follow-up

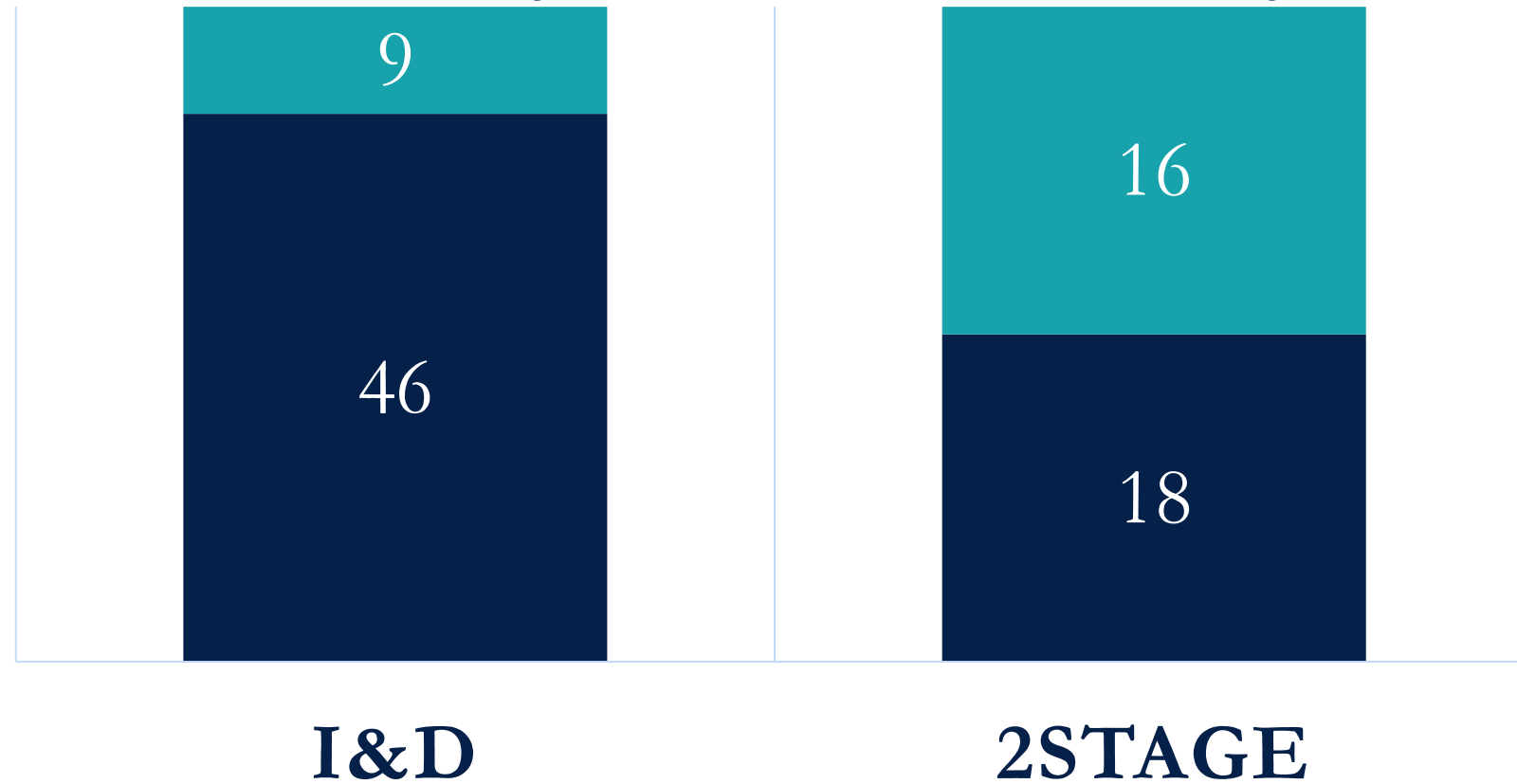
	I&D (55pts)	Two-Stage (34pts)	p-value
Ambulatory	39 (70.9%)	20 (64.7%)	0.26
No assistive devices	27 (49.1%)	11 (32.4%)	

No difference in ambulation rates



KNEE STATUS FINAL FOLLOWUP

■ Functional Joint ■ Nonfunctional Joint



■ More patients with I&D had a functional knee joint at final follow-up ($p=0.002$)

■ 9/39 (23%) 2-stage cases were never reimplanted

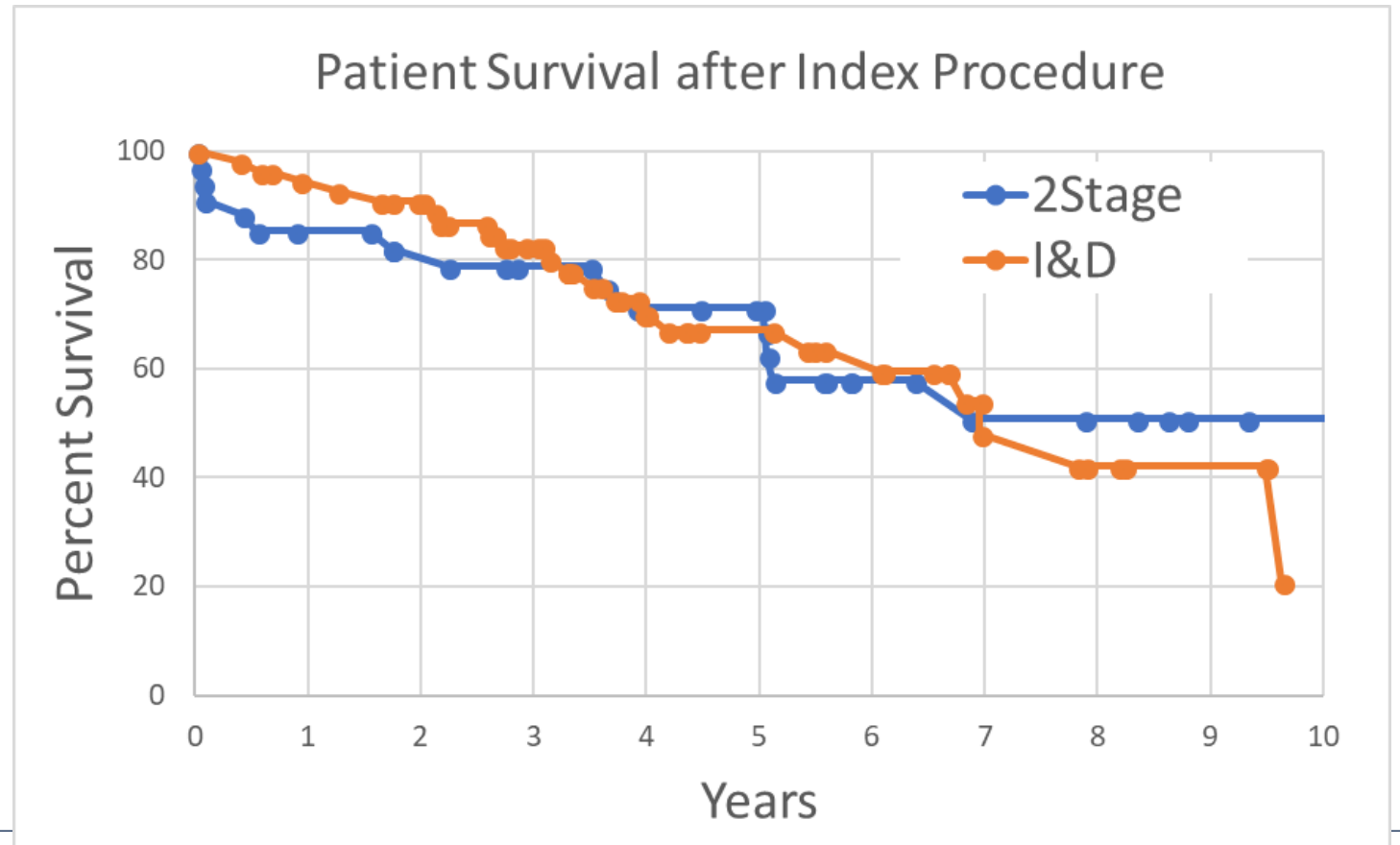
■ 50% of 2-stage end up fused, amputated or retained spacer

Mortality

- 2 year mortality
 - I&D – 10%
 - 2Stage – 19%
- 5 year mortality
 - I&D – 32%
 - 2Stage – 29%

No difference in survival

	I&D (55 patients)	Two-Stage (34 patients)	p
Deceased	22 (40.0%)	13 (38.2%)	0.83
Mortality <1 year	3 (5.0%)	5 (15%)	



Caveat

- ONLY for knee PJI with extensive hardware
- Do NOT extrapolated to chronic infections of primary or simple revision implants as excuse to do I&D
 - Still best treated by 2-Stage Exchange (or 1-stage?)



The Art of the DAIR

- The solution to pollution is dilution
 - 1950 environmental policy
 - Current orthopaedic surgeon



Practical Applications of Stacks to Minimize Pollution Problems*

"Rules of thumb" for stack design have been developed for use on problems where extensive studies cannot be justified or where quantitative design data are unavailable. The application of these rules to a practical stack design problem is discussed. The IBM 704 computer has been used for rapid yet rigorous stack design studies. The computer procedures for design are discussed and its application to a practical problem is described in detail.

Journal of the Air Pollution Control Association

November 1964 / Volume 14, No. 11

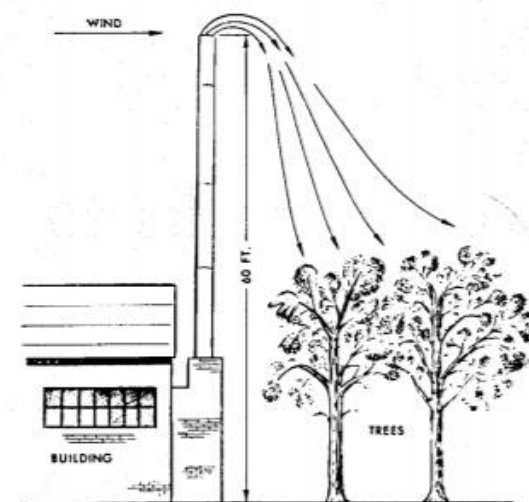


Fig. 1. Gases ejected at a low velocity were caught in the turbulent wake of this stack.

Table III—Wind Speed Data Used in Chlorine Ground Concentration Study

Defined Wind Characteristic	Velocity		Diffusion Coefficient	
	MPH	FPS	Horizontal	Vertical
Average strong wind	15	22.0	0.05	0.08
Extreme strong wind	22	32.3	0.05	0.08
Average breeze	8	11.7	0.02	0.04

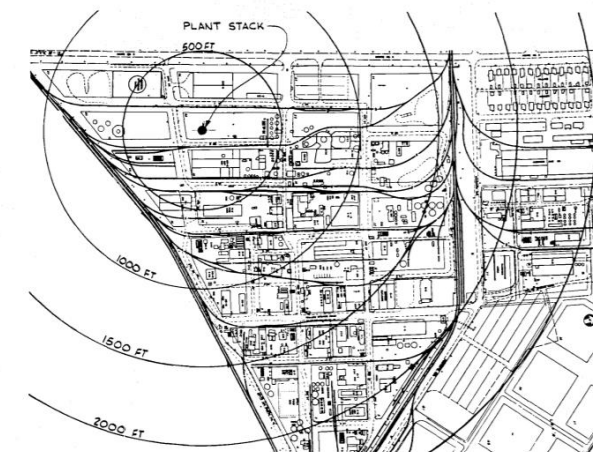


Fig. 6. Area map.



How I (ideally) do a DAIR, spacer or 1stage

■ Two full setups (Dirty and Clean)

- Dirty table: debridement stuff, explant tools, cutblocks, and trials
- Clean table: new full setup (drapes, gowns, retractors, power, bovie etc), implantation tools, closure instruments



Because its never “your”
team when its spacer time....



Setups for Explant and Articulating Knee Spacer

First Table (Dirty)

- Basic and knee set
- Power
- 5mm round burr
- Moreland set
- Bunion oscillating saw blade
- Oscillating saw for patellar removal
- Recip saw
- 4 culture tissue specimen tubes (knee #1,2,3,4)
- 9L saline
- Betadine wash (packet in 200 saline)
- Peroxide wash (1:1 in sterile WATER)
- Pulse lavage + canal brush
- Flexible osteotome (medium length narrow x1)
- Depuy straight canal reamers
- Sigma EM tibia cut block (available not open)
- Sigma IM distal femur cut guide (available not open)
- IM revision femur cut blocks and box cutters (available if needed not open)
- Sigma spacer blocks, poly trials and PS femur trials (open)

Second Table (Clean)

- Basic and knee adds (second set)
- 2nd power (second set)
- New gowns and gloves for all
- New extremity drape and impervious stockinette
- Chloroprep stick and new coban
- Palacos R: 3 bags with 3 cheap blue mixing bowls with antibiotic mix individualized per patient (default 2g vanc and 2.4 tobra per pack)
 - 1 bag to build dowels; 1 bag to cement femur; 1 bag to cement tibia
- New bovie, suction, pulse lavage with 3L bag
- Threaded Steinmann pin set
- Biggest chest tube
- 10 blade x1
- Implants will be opened to this table
- Large hemovac x1
- Closure suture: #1 PDS pops; #2 Quill; 2-0 ylack (24"); 3-0 nylon
- Prevena wound dressing (prevana plus for big whack)
- Knee immobilizer



How I (ideally) do an I&D, spacer or 1stage

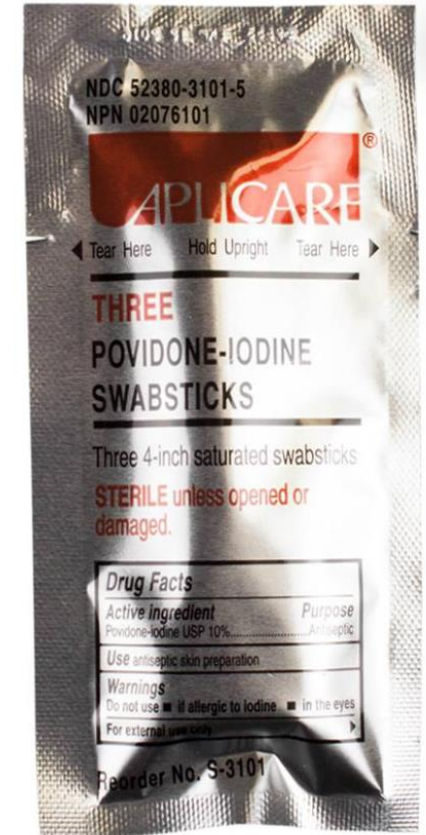
- Remove components (liner vs everything)
- **THOROUGH debridement** including posterior synovium if a knee – ENDO
- New cuts/trial
- Irrigate
 - 3L Saline
 - 100cc H₂O₂ in 100cc of sterile water x2 mins (wipe down surroundings and instruments with the mix while waiting)
 - 3L Saline
 - 0.3% betadine soak x3 mins (packet from foley or spinal kits in 500cc saline)
 - 3L Saline (rest of team go change gloves/gowns)

CLEAN

- New drape and gown/gloves (whip closure and reprep for 1v2stage protocol)
 - **New stockinette/coban to below knee**
 - **Extremity drape over top**
 - **Reprep ioban exposed**
 - **3 L wash again**
- Final implants then another 1-2L then closure

Irrigations Options

- Normal Saline
- Bacitracin
- Castile soap
- Benzalkonium chloride
- Povidine iodine
- Ringer's solution
- Neomycin sulfate
- Ethanol
- Acetic acid
- Chlorhexidine gluconate
- Cephalothin sodium
- Carbenicillin indanyl sodium



Not necessarily universally applicable

Complications - Infection

Antiseptics Commonly Used in Total Joint Arthroplasty Interact and May Form Toxic Products

Sean T. Campbell, MD ^{a, *}, Lawrence H. Goodnough, MD, PhD ^a, Chase G. Bennett, MD ^a,
Nicholas J. Giori, MD, PhD ^{a, b}

^a Orthopaedic Surgery, Stanford Hospital, Stanford, California

^b Palo Alto VA Hospital, Palo Alto, California

The Journal of Arthroplasty 33 (2018) 844–846

- Chlorhexidine, betadine, and peroxide all seem to be ok together
- Don't put Dakins hypochlorite (NaOCl) with any of the above however as create toxic precipitates

Deleterious Effects of Diluted Povidone–Iodine on Articular Cartilage

Arvind von Keudell MD ^a, Jose A. Canseco BS ^{a, b, c}, Andreas H. Gomoll MD, PhD ^a

^a Department of Orthopaedic Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts

^b Harvard-MIT Health Sciences and Technology, Massachusetts Institute of Technology, Cambridge, Massachusetts

^c Laboratory for Tissue Engineering and Regenerative Medicine, Department of Anesthesia, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts

The Journal of Arthroplasty 28 (2013) 918–921

- Most of the studies in TJA
 - Betadine bad for cartilage even 0.3% @ 1min chondrotoxic

The Role of Suppressive Abx

Hip and Knee Section, Treatment, Debridement and Retention of Implant: Proceedings of International Consensus on Orthopedic Infections

Jean Noël Argenson ¹, Marius Arndt ¹², George Babis ¹, Andrew Battenberg ², Nicolaas Budhiparama ², Fabio Catani ³, Foster Chen ⁴, Brian de Beaubien ⁵, Ayman Ebied ⁶, Silvano Esposito ⁷, Christopher Ferry ⁵, Henry Flores ³, Andrea Giorgini ³, Erik Hansen ⁸, K.D. Hernugrahanto ², Choe Hyonmin ⁶, Tae-Kyun Kim ⁹, In Jun Koh ⁹, Georgios Komnos ¹⁰, Christian Lausmann ¹², Jeremy Loloi ⁵, Jaime Lora-Tamayo ^{11,12}, I. Lumban-Gaol ², F. Mahyudin ², Mikel Mancheno-Losa ^{11,12}, Camelia Marculescu ⁹, Sameh Marei ⁶, Kimberly E. Martin ⁵, Prashant Meshram ⁹, Wayne G. Paprosky ⁴, Lazaros Poultsides ³, Arjun Saxena ³, Evan Schwechter ⁴, Jay Shah ⁸, Noam Shohat ⁶, Rafael J. Sierra ¹, Alex Soriano ¹³, Anna Stefánsdóttir ¹⁰, Linda I. Suleiman ⁴, Adrian Taylor ⁹, Georgios K. Triantafyllopoulos ³, Dwikora Novembri Utomo ², David Warren ¹², Leo Whiteside ⁵, Marjan Wouthuyzen-Bakker ^{6,13,14}, Jean Yombi ¹⁴, Benjamin Zmistowski ¹¹

The Journal of Arthroplasty 34 (2019) S399–S419

Efficacy of indefinite chronic oral antimicrobial suppression for prosthetic joint infection in the elderly: a comparative study

V. Prendki^a, P. Sergent^b, A. Barrelet^c, E. Oziol^d, E. Beretti^e, M. Berlioz-Thibal^f, F. Bouchand^g, F.A. Dauchy^h, E. Forestierⁱ, G. Gavazzi^j, C. Ronde-Oustau^k, J. Stirnemann^a,

International Journal of Infectious Diseases 60 (2017) 57–60

Prolonged suppressive antibiotic therapy for prosthetic joint infection in the elderly: a national multicentre cohort study

Eur J Clin Microbiol Infect Dis (2017) 36:1577–1585
DOI 10.1007/s10096-017-2971-2

Suppressive antibiotic therapy with oral doxycycline for *Staphylococcus aureus* prosthetic joint infection: a retrospective study of 39 patients

M. Pradier^a, S. Nguyen^b, O. Robineau^{a,c}, M. Titecat^{c,d}, N. Blondiaux^a, M. Valette^a, C. Loïez^c, E. Beltrand^a, H. Dézeque^c, H. Migaud^{c,d}, E. Senneville^{a,c,d,*}

International Journal of Antimicrobial Agents 50 (2017) 447–452

Chronic Suppression ≠ Failure

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Length of Endoprosthetic Reconstruction in Revision Knee Arthroplasty Is Associated With Complications and Reoperations

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Mo' metal, mo' problems

— The Notorious B.I.G. —



My Practice in Nutshell

- Acute postop or hematogenous* PJI (~4-6 weeks for postop and ~4 weeks max for hematogenous)

- Primary or revision components
 - DAIR (I&D) with full double setup
 - Component exchange of anything not ingrown yet
 - 4-6 weeks IV
 - Lifelong suppression if any retained foreign materials

- Other adjuncts not covered to consider:

Incisional wound vacs for all infection cases, resorbable abx beads in DAIR, topical antibiotics, prolonged abx post-reimplantation

- Chronic infection

- Primary implants
 - 1v2 stage exchange (study)
 - If not eligible for study → 2 stage
 - Articulating spacers except extreme circumstances
- Revision implants
 - 2 stage vs DAIR (I&D) with lifelong suppression

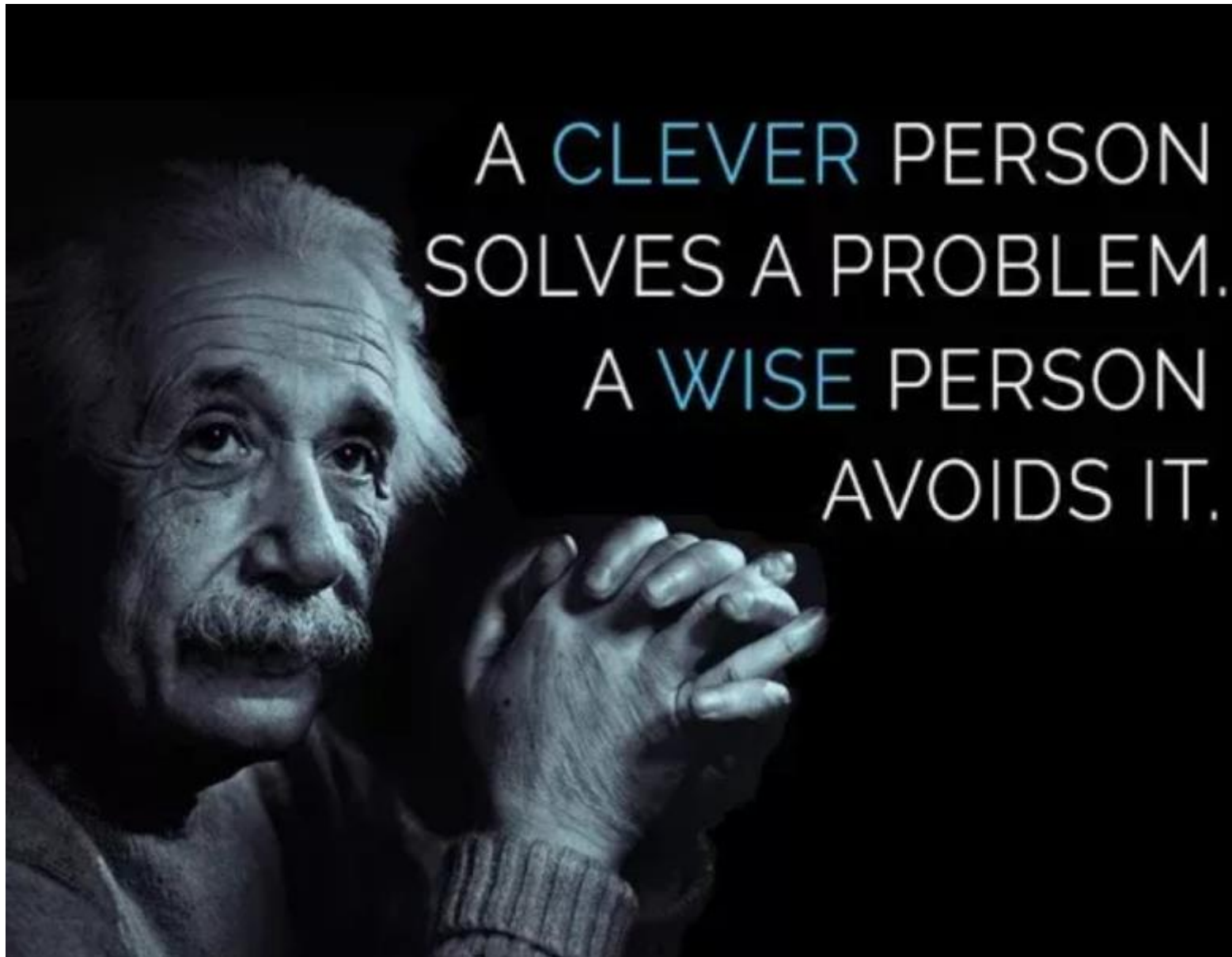
The Sobering Truth

- We may never completely “cure” PJI – maybe best we achieve is equilibrium

Bacteria



Host Immune
System +/-
Abx



Why is Optimization Important?



Take Home Points



1. Periprosthetic joint infection is deadly
2. Hold off on widespread 1-stage exchange until RCT data finalized (very close!)
3. DAIR and 1-stage success data is technique/protocol dependent
 - Know indications
 - Do at a minimum a pseudo double setup
 - Don't be afraid of chronic suppression
4. PJI with **extensive** hardware may be better served with DAIR than a morbid 2-stage
5. Easiest way to improve our outcomes – prevention/optimization





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