INFEZIONI, *CONTROLLO SANGUE E DOLORE*

1. Infection and failure rates following THR in septic arthritis :A case controlled study
2. Acetabular spacers in two stage hip revision: does it worth? A controlled clinical trial
3. Which is the most reliable laboratory test for infected THA?
4. Hip fracture surgery in conventional mixed use emergency theatre- Is it safe?
5. " Infection compliance" A possible system to link data about patients with infected joint replacements
6. Analysis of the risk factors predisposing to periprosthetic hip infection and treatment options
7. Acute Late Infection in Metal-on-Metal Hip Arthroplasty: Another Severe Complication?
8. Synovasure PJI: are we really sure?
9. The Outcome of Two-Stage Revision for Infected Total Hip Arthroplasty in a Tertiary Centre
10. Is there a Role for Partial Revision Hip Replacement in Infection?
11. Acetabular reconstruction using tantalum augments and impaction graft in single stage revision for periprosthetic infection
12. Revision Total Hip Arthroplasty: diagnosing infection, is aspiration useful?
13. Atipical THR infections management
14. Two Stage Revision With Preformed Spacers in Infected Hip Arthroplasty
15. Single Stage Exchange for the Infected THA
16. *Comparable blood loss after THA with dabigatran enoxaparin and rivaroxaban, results of a randomised clinical trial*
17. *A systematic review of pain assessment and analgesia in patients with cognitive impairment and neck of femur fractures*
18. *Hip Fractures And Anticoagulation: The Effectiveness Of Warfarin Reversal*
19. *Is there a role for the periarticular injection in decreasing post operative pain and length of inpatient stay in primary total hip arthroplasty? A systematic review and meta-analysis*
20. *Universal Tranexamic Acid Therapy to Optimize Patient Blood Management for Major Joint Arthroplasty*
21. *Local use of tranexamic acid in patients undergoing hip or knee arthroplasty to minimize the blood loss*
22. *Topical use of high dose tranexamic acid in THR*
23. *A novel approach to control pain following total hip replacement*
24. *Venous Thromboembolism After Lower Limb Arthroplasty: Does Chemical Prophylaxis Reduce The Risk?*
25. *Is Extended Venous Thromboembolism Prophylaxis Being Prescribed Correctly After Elective Total Hip and Knee Arthroplasty and Fracture Neck Of Femur Surgery?*

Infection and failure rates following THR in septic arthritis :A case controlled study

Papanna M;BuckleySB;Stockley I;Hamer AJ

International Combined Meeting BHS-SIDA - 2015

Introduction

- Total hip arthroplasty following septic arthritis of the hip can be performed as a single stage or 2 stage procedure.
- Multiple factors may dictate what type of surgery is undertaken.
- Two stage revision of the infected hip prosthesis with interval antibiotic loaded cement spacer is a well established treatment for infected THR
- Recurrence of the infection and failure of the total hip arthroplasty are the most serious complication.

Aim of the study

- A case controlled study

- To assess clinical and radiological outcomes of total hip replacement in a consecutive series of patients treated for septic arthritis of the hip with a 2-staged procedure for acute infection and single stage procedure for quiescent infection.

- The outcomes measured were : recurrence of infection, re-revision for infection and aseptic prosthesis loosening, and clinical outcome at the last follow-up after revision.

Null Hypothesis

- Incidence of failure due to infection following total hip arthroplasty for septic arthritis and primary osteoarthritis of the hip is the same.

Material and methods

- March 2000 and Mar 2013, eighteen cases of septic arthritis of the hip were treated with total hip arthroplasty
  - *11 men and 7 women with a mean age of 56.5yrs (range:30-83)*
- The control cases had total hip arthroplasty for degenerative osteoarthritis as a elective procedure
  - *10 men and 8 women, Mean age 58yrs (range:36-80)*
- Both groups were comparable with age, gender, BMI, follow-up period, type of anaesthesia, ASA score.
- All patients included in the series had more than 18 mts of follow-up.

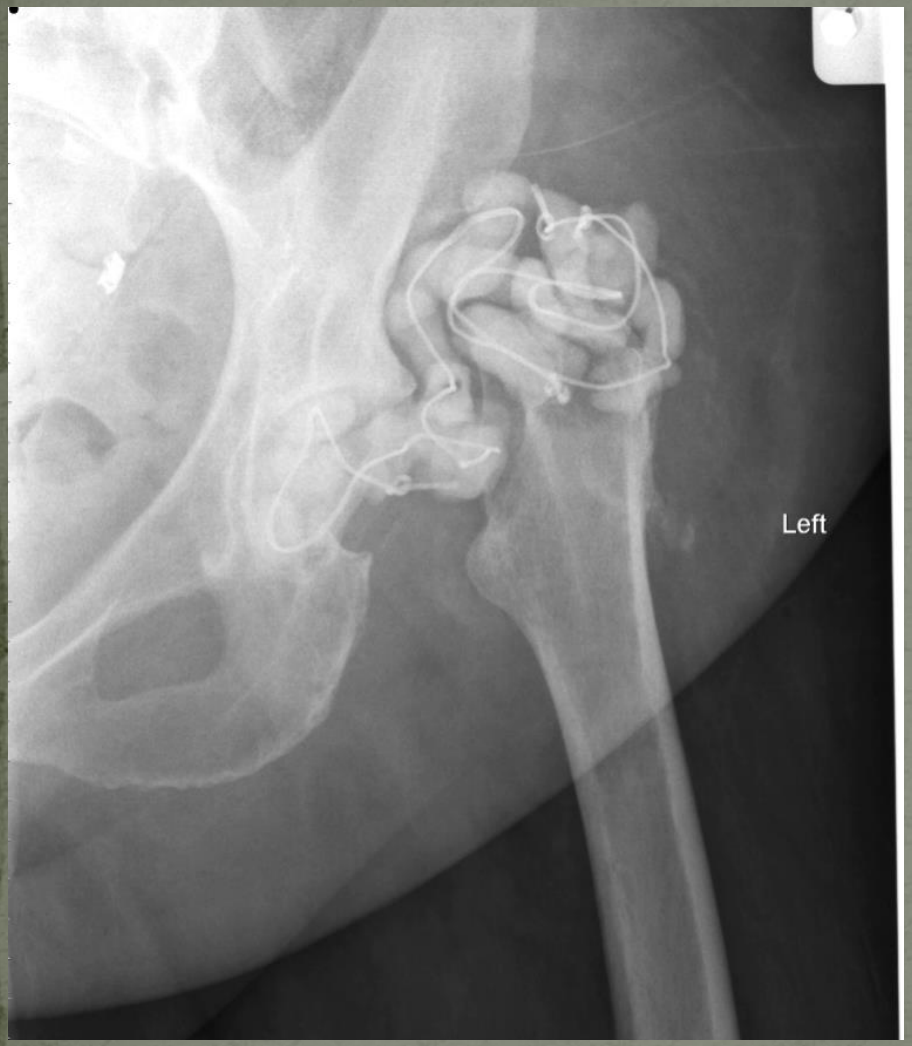
Patients characteristics in the two series

	Septic arthritis(n-19)	Osteoarthritis(n=18)	P-value
Age(Years)	58 ± 11	56.5 ± 13	NS
Gender(M/F)	11/7	10/8	NS
BMI(kg/m^2)	26 ± 3	25 ± 2	NS
Type of anaesthesia(GA:SA)	8 :10	7 :11	NS
ASA Scores	ASA 1: 2 ASA 2: 12 ASA 3: 4	ASA 1:3 ASA 2:12 ASA 3: 3	NS

Comparison of the complication rate and other variables were analysed with the Chi square test. The level of significance was set at 5%.

Material and methods

- A two stage hip arthroplasty was performed in all cases with positive microbiology
- The first stage comprised of total synovectomy with joint resection and placement of antibiotic loaded cement beads in the hip joint.
- Cement beads were made of Palacos/Copal cement mixed with a high dose of gentamicin or vancomycin.
- The blood inflammatory markers were normal in all patients prior to the second stage procedure and this involved further debridement and total hip joint replacement.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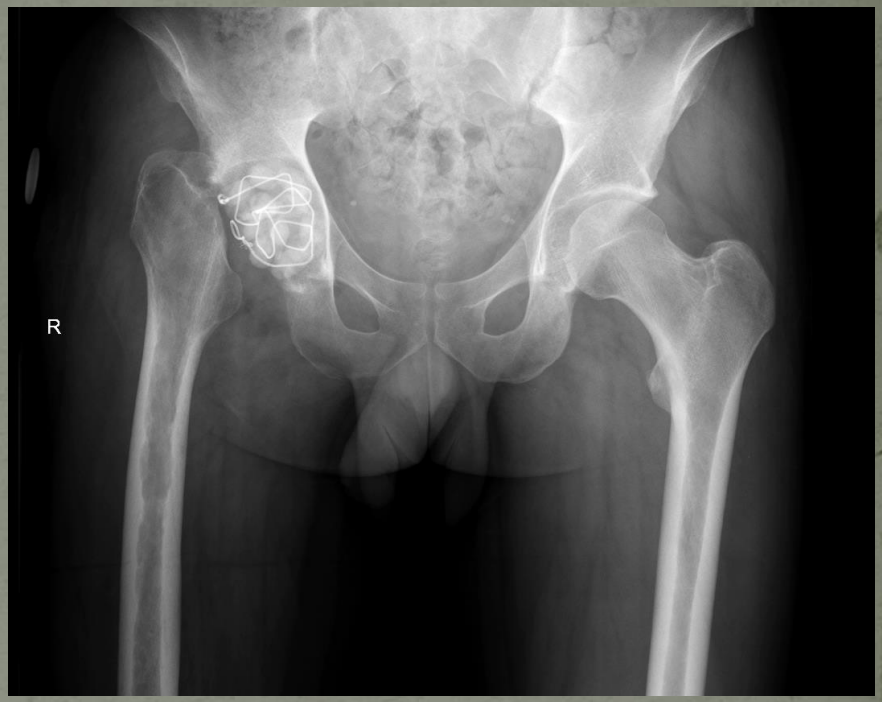
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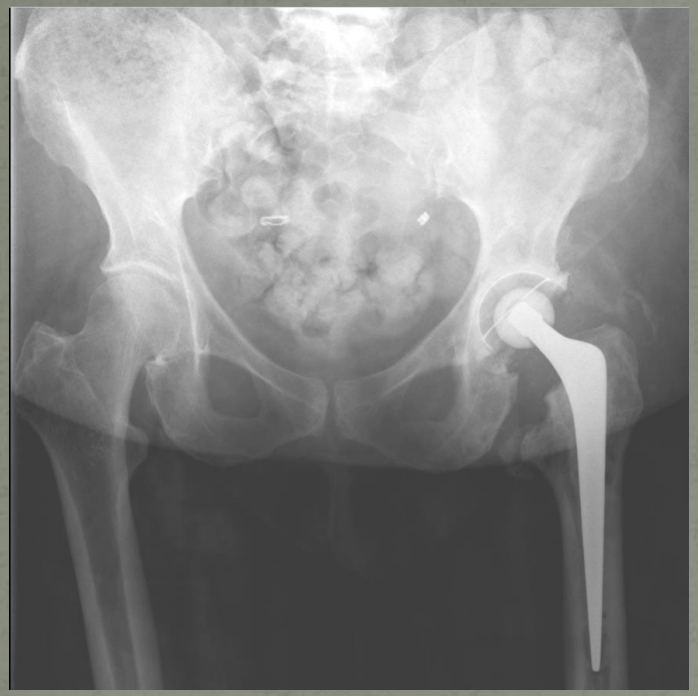
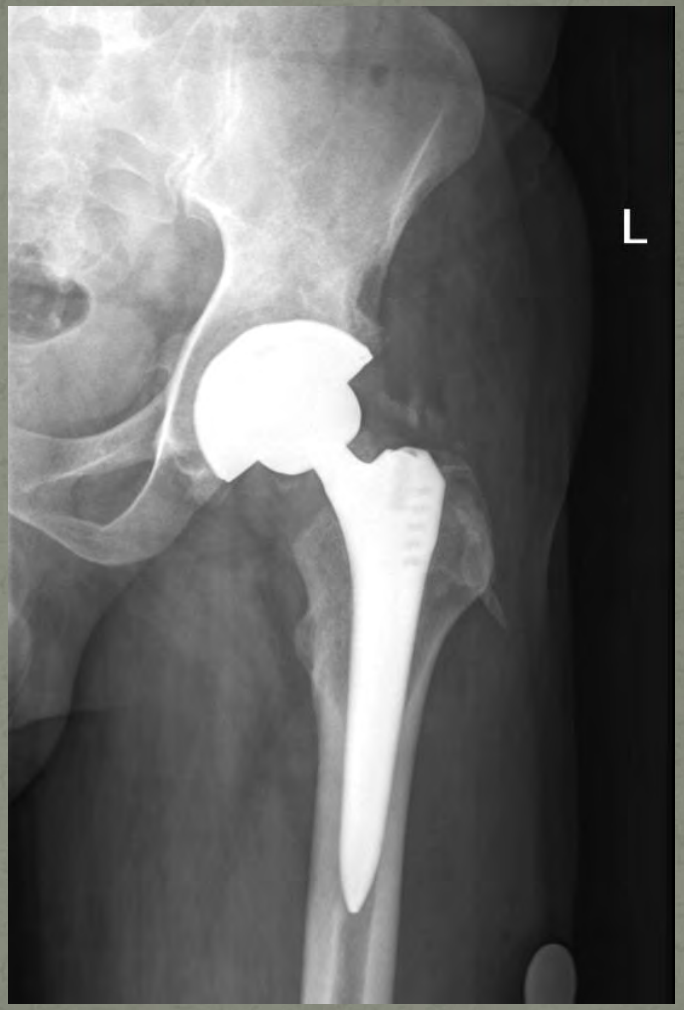



L

Clinical and Microbiological data

Origin of infection

- Haematogenous -11
- IVDU and Others -6

Status of infection

- Active - 12
- Quiescent- 7

- Pre operative hip aspirate + 11/18
- Intra-operative tissue specimen+ 4/18

Microbiology

- Staph Aureus: 11
- Streptococcus: 1
- Klebsiella + enterococcus: 1
- Polymicrobial: 1
- MRSA: 1

Results

- Mean interval of 4 months (Range:3-5months) between each stage
- 11 (61 %) patients had 2-staged procedure
- In quiescent septic arthritis, single stage THR was performed at a mean of 5 years (Range:2-10) after initial episode of sepsis
- All control patients had planned THR

Results

	Septic arthritis	Osteoarthritis
Type of Prosthesis Cemented:Uncemented	12:6	13:5
Follow-up duration(Months)	70 (Range:20-120)	72(Range:21-124)
Complication	3	4

The functional level in terms of mobility and ADL were similar in both groups following THR.

Complications

- Septic arthritis group

  Dislocation – 1

  Heterotrophic ossification – 2

  [Lost to follow-up-1]

Osteoarthritis group

Heterotrophic ossification-3

Prosthetic infection :1

Discussion

Article	No of Hips	Time to 2nd stage (Average, Weeks)	Follow-up (Average, Months)	Re-infection after THR
Our study	12	16	70	0/12
Romanò et al (2011)	20	22	56	1/20
Bauer et al (2010)	13	6	60	2/13
Huang et al (2010)	15	13	42	0/15
Kelm et al (2009)	8	12	12	0/8
Diwanji et al (2008)	9	23	42	1/9

Group of patients treated with 2 stage hip arthroplasty

Conclusion

- Two-stage hip arthroplasty in presence of active infection and a single stage procedure in case of quiescent septic arthritis achieved outcomes similar to the control group.

Thank You

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Acetabular spacers in two stage hip revision: does it worth? A controlled clinical trial.

G. Burastero[1], G. Carrega[1], L. Cavagnaro[2], M. Basso[2], L. Felli[2].

1. Malattie Infettive Osteo - Articolari (MIOA), Ospedale Santa Maria di Misericordia – Albenga (SV)
2. Clinica Ortopedica, IRCCS Ospedale San Martino – IST - Genova

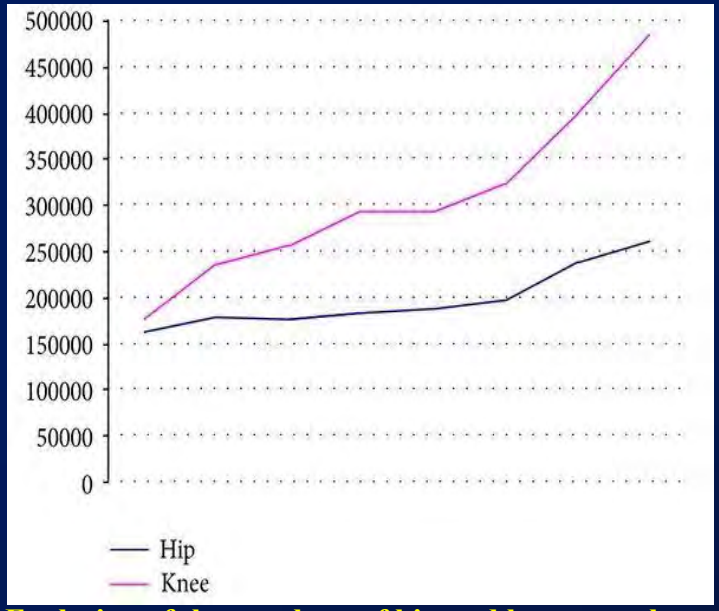
Disclosure

None

0,8 – 2,6 % primary THA's

8 - 12 % revision THA's

33% mortality at 5 y



Evolution of the numbers of hip and knee prostheses implanted in the USA between 1990 and 2004.

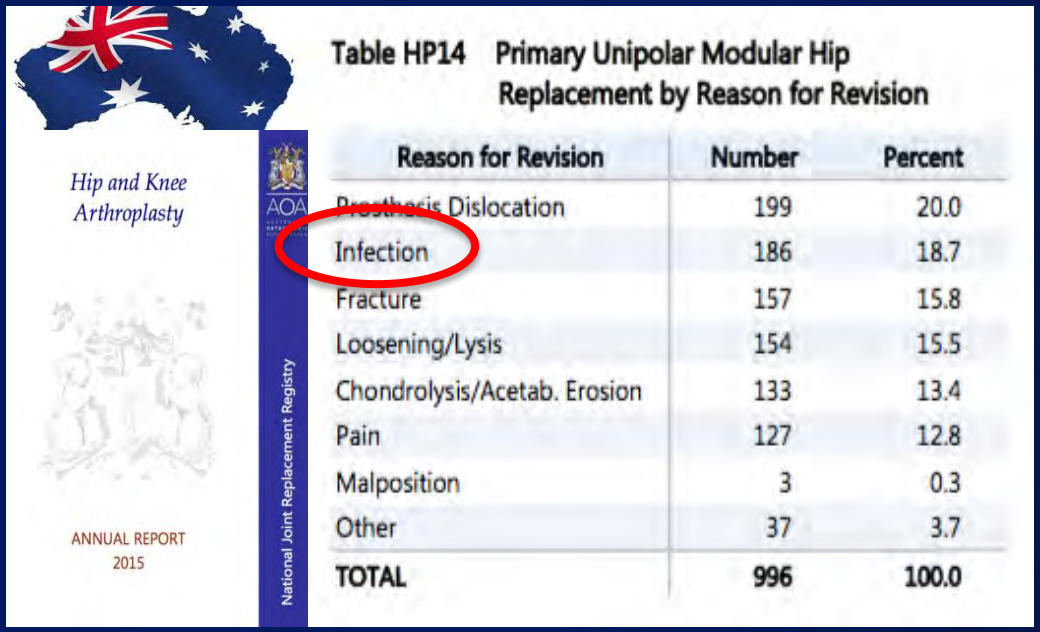
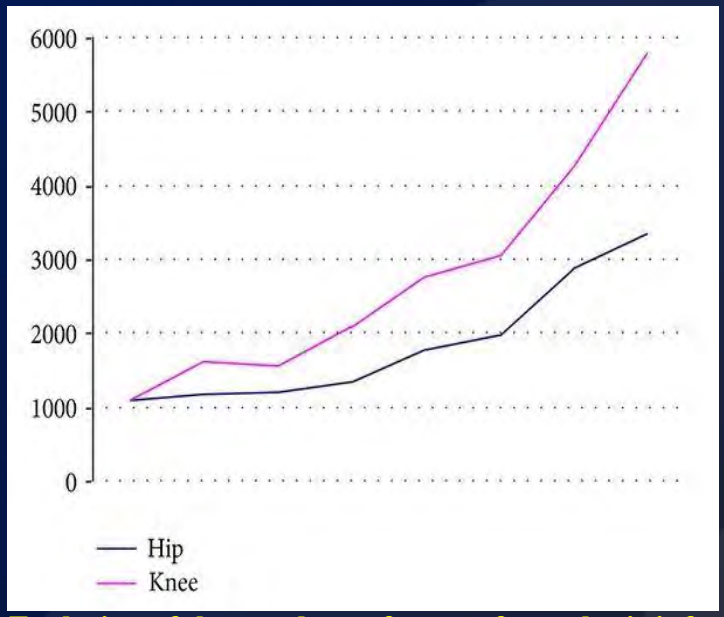


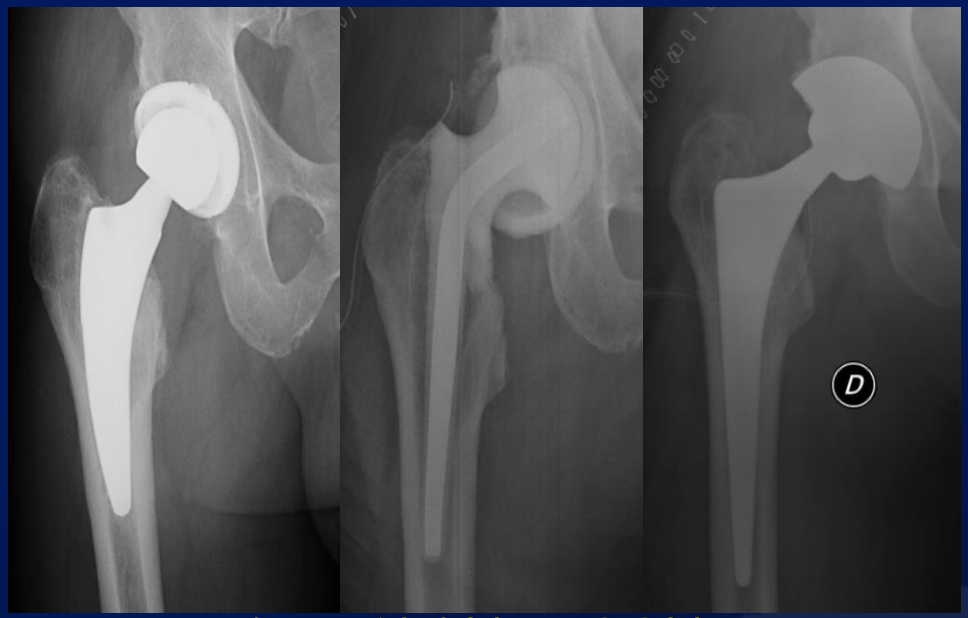
Table HP14 Primary Unipolar Modular Hip Replacement by Reason for Revision

Reason for Revision	Number	Percent
Prosthesis Dislocation	199	20.0
Infection	186	18.7
Fracture	157	15.8
Loosening/Lysis	154	15.5
Chondrolysis/Acetab. Erosion	133	13.4
Pain	127	12.8
Malposition	3	0.3
Other	37	3.7
TOTAL	**996**	**100.0**



Evolution of the numbers of cases of prosthesis infection diagnosed in the USA between 1990 and 2004.

Two stage: gold standard (87 – 93 %)



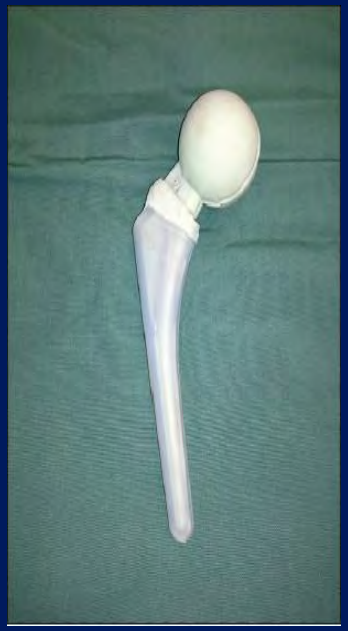
Overall mechanical complication rate interstage period : 13,2% – 58,8%

- **SPACER DISLOCATION (0 – 41 %)**
- **ACETABULAR WEAR**
- **SPACER FRACTURE (0 – 10,2 %)**
- **PERISPACER FRACTURE (0 – 13,6 %)**

Faschingbauer M, Reichel H, Bieger R, Kappe T. **Mechanical complications with one hundred and thirty eight (antibiotic-laden) cement spacers in the treatment of periprosthetic infection after total hip arthroplasty.** Int Orthop. 2015 May;39(5):989-94.

Jung J, Schmid NV, Kelm J, Schmitt E, Anagnostakos K. **Complications after spacer implantation in the treatment of hip joint infections.** Int J Med Sci. 2009 Sep 2;6(5):265-73.

Femoral side: strong consensus



What about the cup ?

International Journal of Medical Sciences
2009; 6(5):253-257

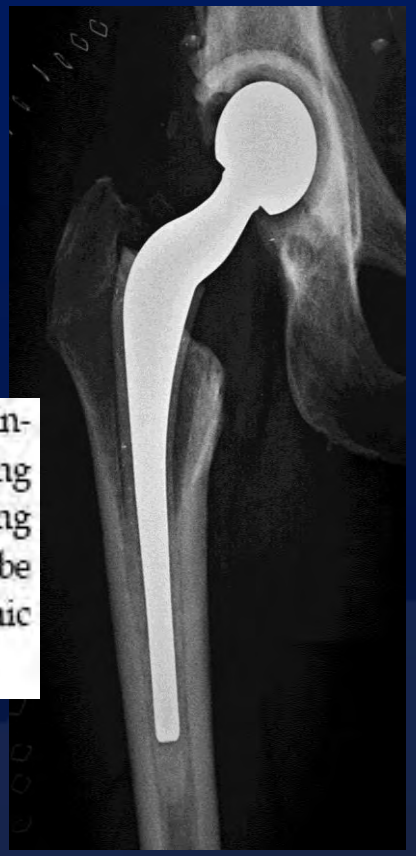
Review

Two-stage procedure in the treatment of late chronic hip infections - spacer implantation

Mohamed Sukeik✉, Fares S. Haddad

Department of Orthopaedics, University College London Hospital, 235 Eus

Articulating spacers provide the advantages of maintaining limb length and joint mobility, minimising soft-tissue contracture and scarring, and facilitating second-stage reimplantation and therefore, should be used as the first option of treatment for late chronic hip joint infections.



Clin Orthop Relat Res (2011) 469:3055–3064
DOI 10.1007/s11999-011-1903-1

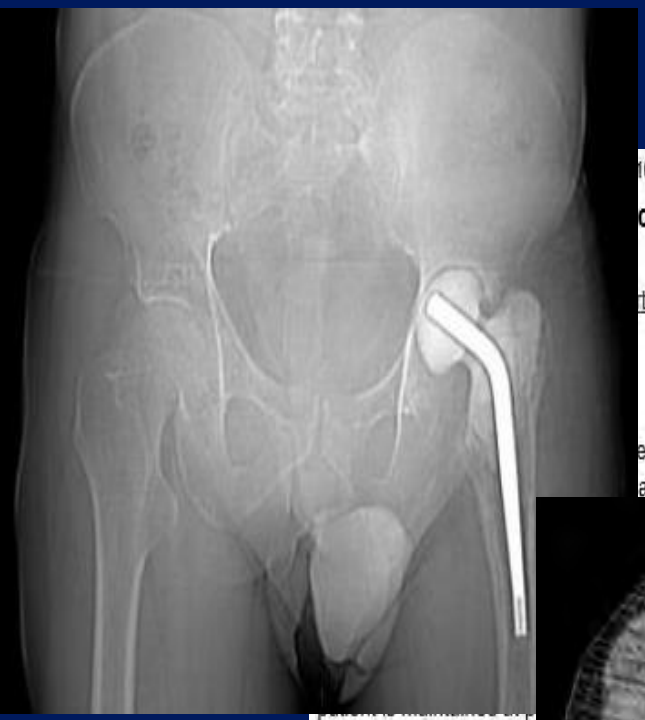
SYMPOSIUM: PAPERS PRESENTED AT THE 2010 MEETING OF THE MUSCULOSKELETAL INFECTION SOCIETY

An Articulating Antibiotic Spacer Controls Infection and Improves Pain and Function in a Degenerative Septic Hip

Erin E. Fleck MD, Mark J. Spangehl MD,
Venkat R. Rapuri MD, FRCS, Christopher P. Beauchamp MD

Conclusions Articulating antibiotic spacers offer acceptable pain relief and function while the infection is treated in this unique group of patients.

ACETABULAR WEAR



10.1016/j.arth.2012.07.013. Epub 2012 Nov 8.

cetabular erosion after antibiotic-impregnated polymethylmethacr

t X, Garcia S, Soriano A.

een described (hand-made, custom-molded or prefabricated) for treatment of a chronic
ated spacer is that it may cause acetabular bone loss. This study assesses the radiolo

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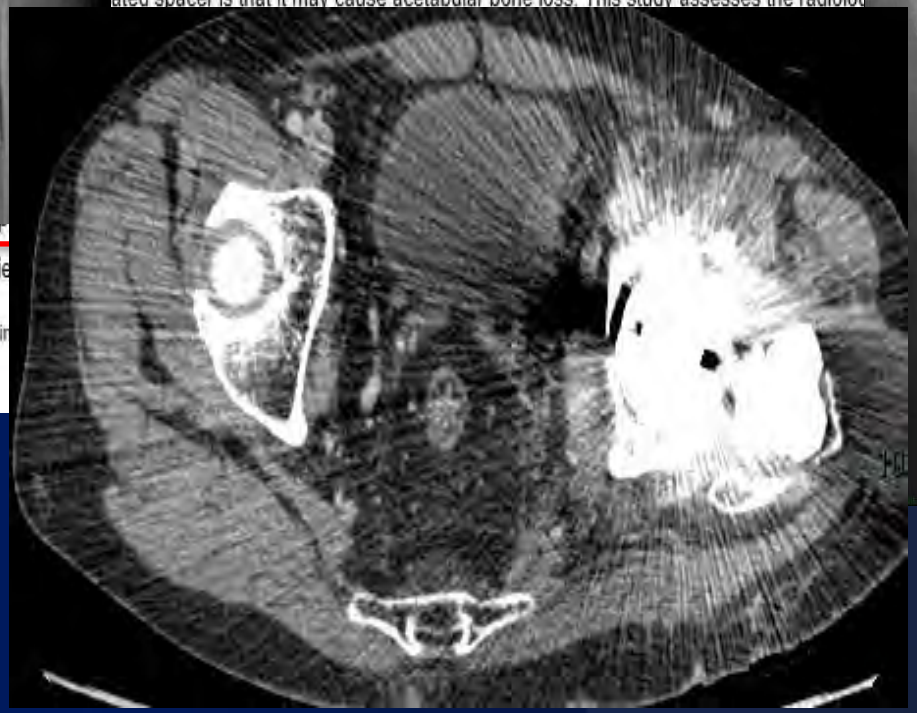
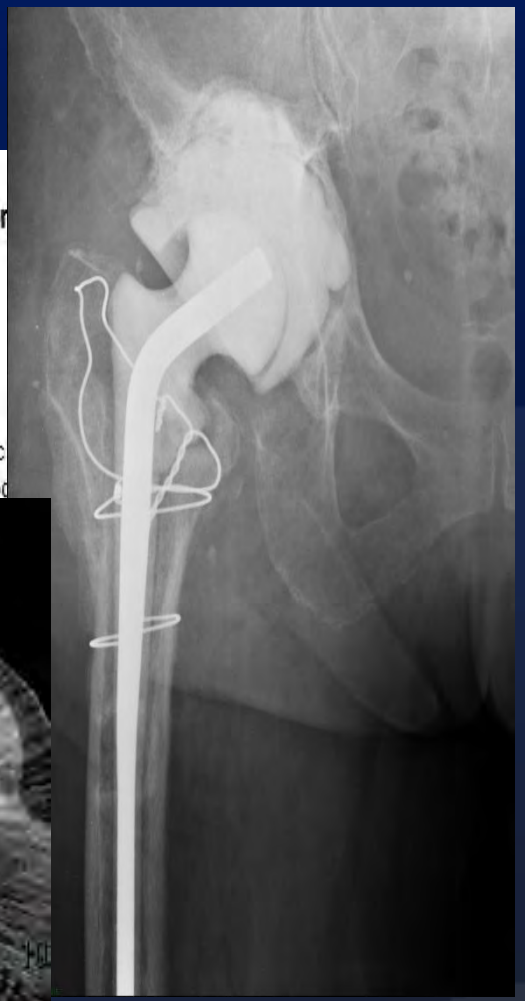
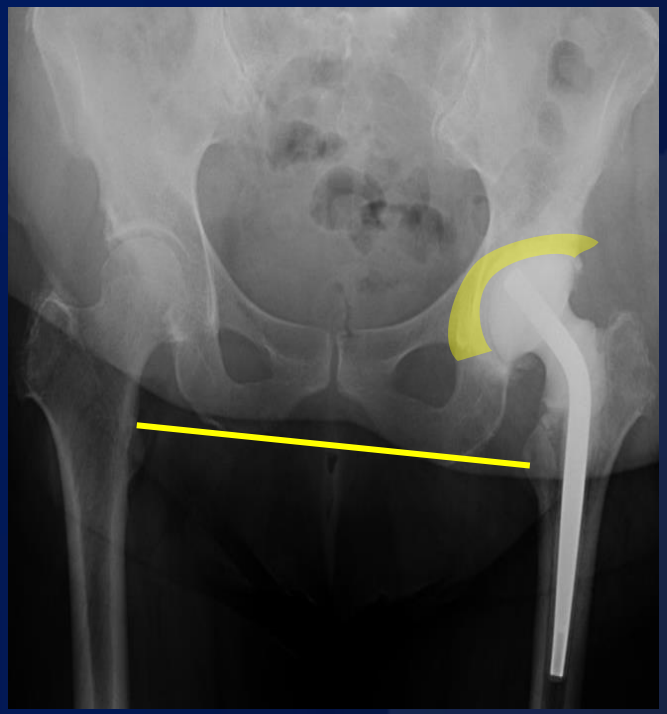
PMID: 23142448 [PubMed - i

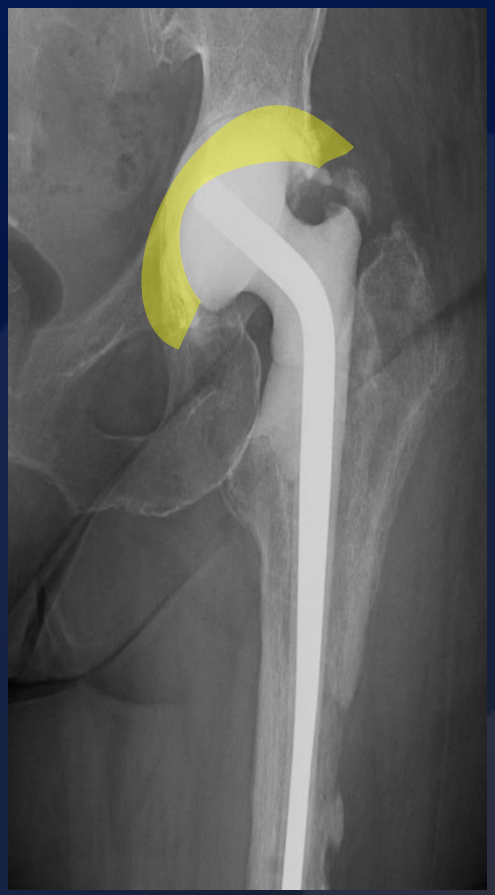




AIM: evaluate an acetabular antibiotic loaded bone cement spacer as a potential approach able to:

- reduce complication of inter-stage period (dislocation, acetabular wear)
- simplify two-stage hip revision surgery
- recover hip biomechanics

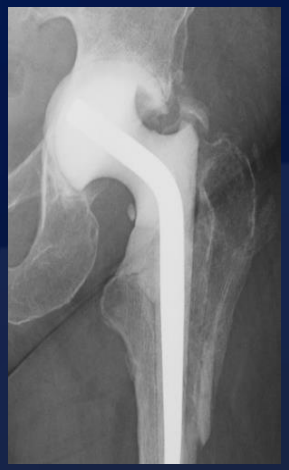




Retrospective controlled trial

66 patients

Group A : acetabular spacer (26)



Group B : femoral spacer only (40)

STUDY POPULATION

GROUP A

14 M, 12 F **Mean age: 68 yo**

Mean F.U. : **33,2 Months**

Paprosky: type 1: **3** type 3A: **8**

type 2: **4** type 3B: **5**

6 no acetabular defects

Mean interstage period: **3 Months**

GROUP B

19 M, 21 F **Mean age: 67 yo**

Mean F.U. : **45,3 M**

Paprosky: type 1: **8** type 3A: **5**

type 2: **6** type 3B: **2**

18 no acetabular defects

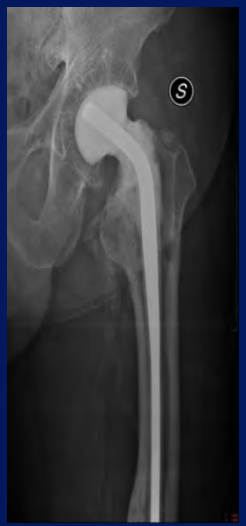
Mean interstage period: **5 Months**

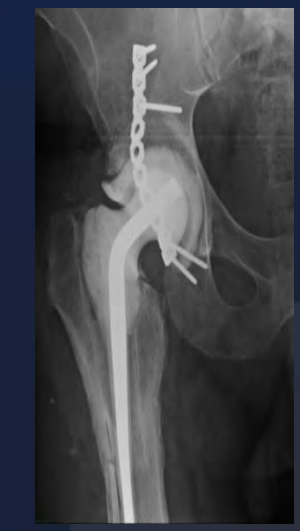
Partial weight bearing during interstage period

RESULTS

Surgical time

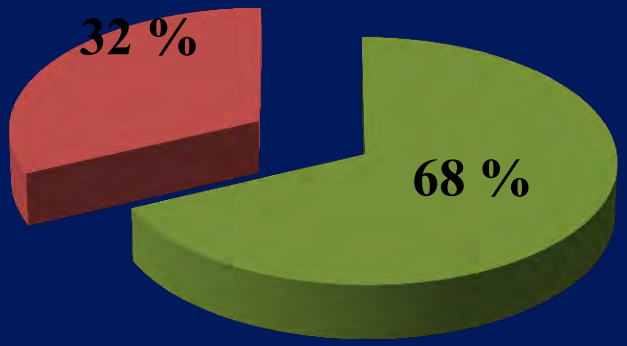
GROUP A		GROUP B
Mean 1st stage time : **148 ± 59 min**	**P : 0,65**	Mean 1st stage time : **142 ± 45 min**
Mean 2nd stage time : **83 ± 35 min**	**P : 0,015**	Mean 2nd stage time : **109 ± 36 min**
	(26 min)	



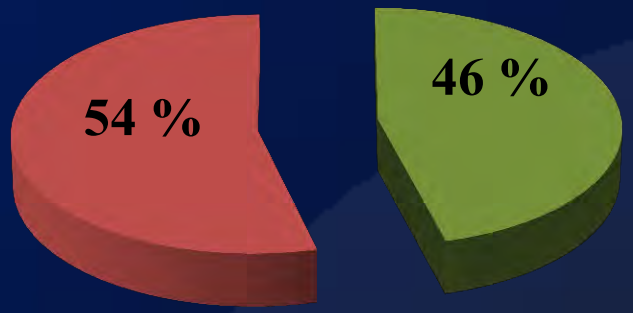


Definitive stem

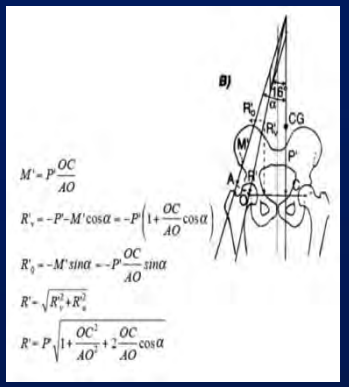
GROUP A



GROUP B



Hip biomechanics



GROUP A

LLD : **1,1 mm**

Offset unaffected side: **52,5 mm**

Offset end of treatment: **61,9 mm**

P : 0,03

GROUP B

LLD : **2,6 mm**

Offset unaffected side: **53,4 mm**

Offset end of treatment: **57,1 mm**

COMPLICATIONS

GROUP A

1 femoral spacer dislocation (3,8 %)

1 perispacer fracture

1 failure (infection relapse) **(3,8 %)**

2 acetabular spacer subluxation **(7,6 %)**

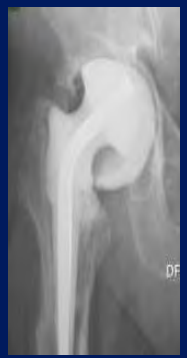
GROUP B

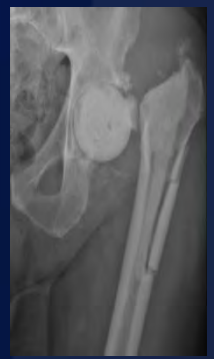
3 femoral spacer dislocations (7,5 %)

1 spacer fracture

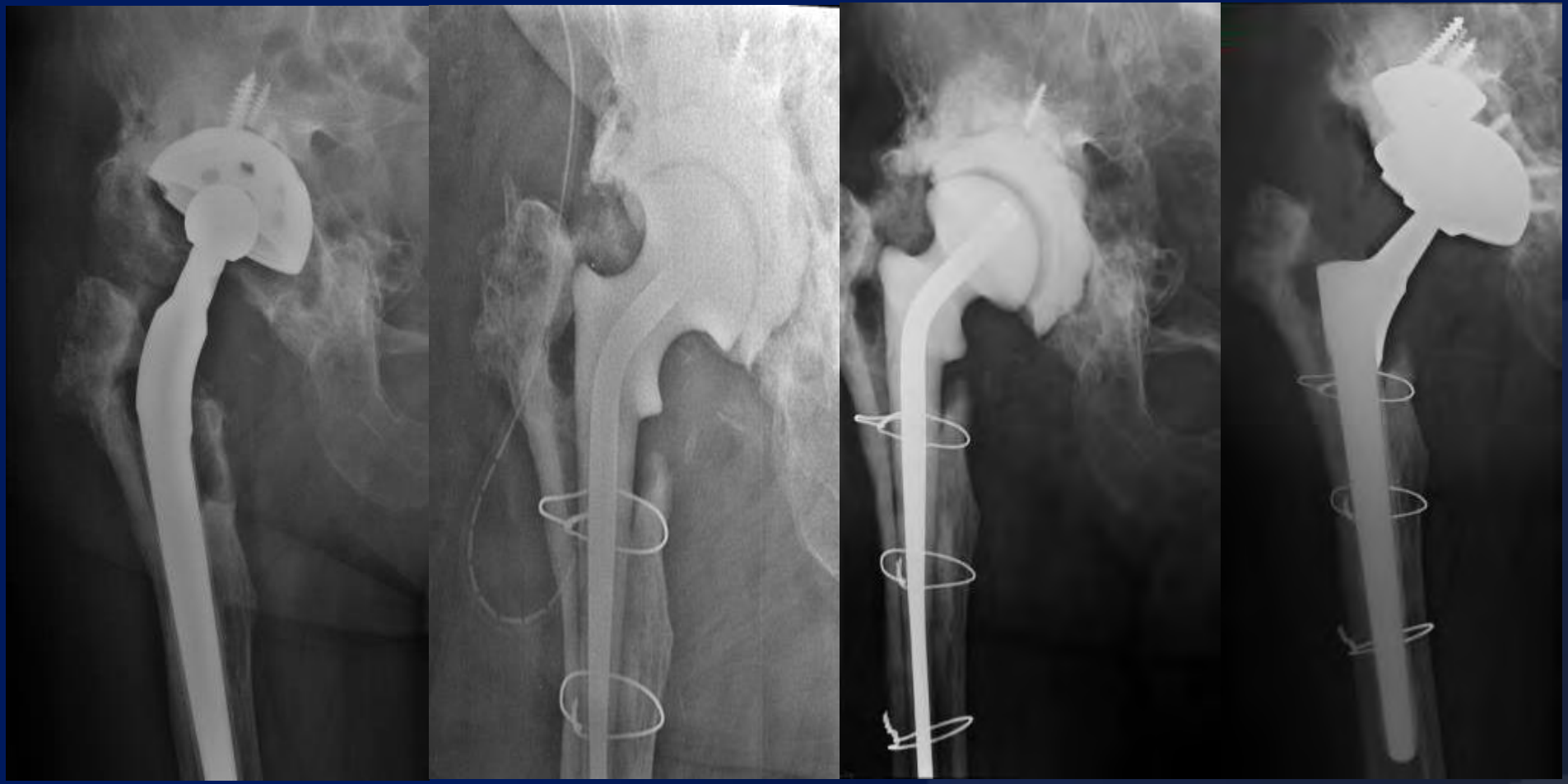
3 failures (infection relapse) **(7,5 %)**

2 periprosthetic femoral fractures (2° stage)





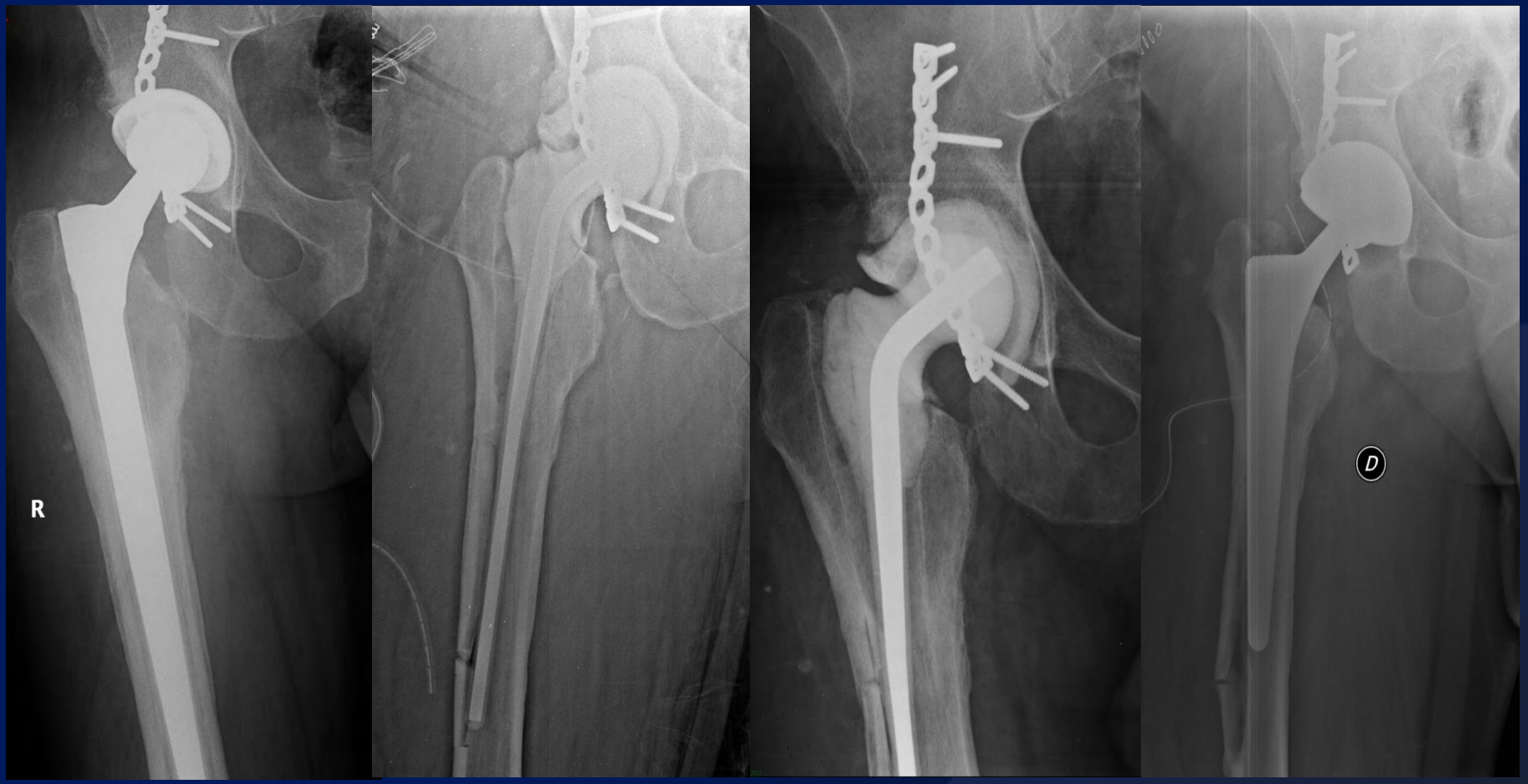
CLINICAL CASE REPORTS



M, 56 yo, hepatopaty, Proteus ESBL, 3B

4 months

6 months after reimplantation



M, 36 yo, MSSA, previous acetabular fracture (3 y before), 3 months After reimplantation

TAKE HOME MESSAGE

Septic hip revision surgery → high complication rate

Consider the spacer as a TEMPORARY ARTHROPLASTY

ACETABULAR SPACER can :

- **preserve acetabular bone stock**
- **simplify 2nd stage**
- **restore hip biomechanics**

THANK YOU

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Which is the most reliable laboratory test for infected THA?

LORENZO DRAGO
IRCCS GALEAZZI – UNIVERSITY OF MILAN

Definition of PJI

AAOS

American Academy of Orthopaedic Surgeons

THE DIAGNOSIS OF PERIPROSTHETIC JOINT INFECTIONS OF THE HIP AND KNEE

GUIDELINE AND EVIDENCE REPORT

Adopted by the American Academy of Orthopaedic Surgeons
Board of Directors
June 18, 2010

IDSA GUIDELINES

Clinical Infectious Diseases 2013;56(1):e1–25

Diagnosis and Management of Prosthetic Joint Infection: Clinical Practice Guidelines by the Infectious Diseases Society of America[a]

Douglas R. Osmon,[1] Elie F. Berbari,[1] Anthony R. Berendt,[2] Daniel Lew,[3] Werner Zimmerli,[4] James M. Steckelberg,[1] Nalini Rao,[5,6] Arlen Hanssen,[7] and Walter R. Wilson[1]

Diagnosis of Periprosthetic Joint Infection

Liaison: **Benjamin Zmistowski BS**
Leaders: **Craig Della Valle MD (US), Thomas W Bauer MD (US), Konstantinos N. Malizos MD, PhD (International)**
Delegates: **Abbas Alavi MD, Hani Bedair MD, Robert E Booth MD, Peter Choong MD, Carl Deirmengian MD, Garth D Ehrlich PhD, Anil Gambir MD, Ronald Huang MD, Yair Kissin MD, Hideo Kobayashi MD, Naomi Kobayashi MD, Veit Krenn MD, Drago Lorenzo MD, SB Marston MD, Geert Meermans MD, Javier Perez MD, JJ Ploegmakers MD, Aaron Rosenberg MD, C Simpfendorfer MD, Peter Thomas MD, Stephan Tohtz MD, Jorge A Villafuerte MD, Peter Wahl MD, Frank-Christiaan Wagenaar MD, Eivind Witzo MD**

Published online in Wiley Online Library (wileyonlinelibrary.com). DOI 10.1002/jor.22553

 J Orthop Res 32:S98–S107, 2014.

Italian Association of Clinical Microbiologists AMCLI

Percorso diagnostico presentato durante il XLII Congresso Nazionale AMCLI Rimini, 12-15 novembre 2013

INFEZIONI DELLE PROTESI ARTICOLARI E DEI MEZZI DI OSTEOSINTESI

A cura di:

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TOWARDS A MORE EFFICIENT LAB DIAGNOSYS: *The Six Landmarks*

1. **Ability for processing Multiple Samples from the site of infection**
2. **Selection of the Transportation System**
3. **Chemical biofilm debonding or sonication of prosthetic components**
4. **Inoculation of Synovial Fluid or biopsy directly into broth culture Ae&Ana**
5. **Prolongation of Incubation for up to 14 days**
6. **Alternative tests: CRP, IL6, Esterase, Alpha-defensin,**

Does any HOSPITAL follow these simply rules???

ISOC Questionnaire

Results and Conclusions

- "Low" concordance
- Discordances Not understandable
- Different Methods and Procedures
- Transportation –Storage was a very controversial matter

IMPACT OF A WRONG or DELAYED DIAGNOSYS

- HEALTHY SYSTEM COSTS
- PATIENTS

Microorganisms dependent factors

- **Microbial contamination?**
  + 41%

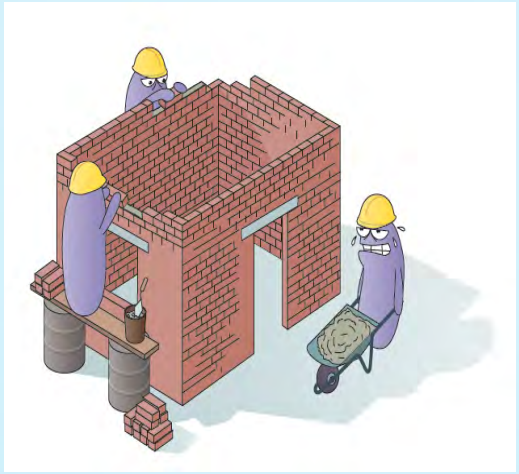
True Negative?

- **Culture-Negative**
  -29%

Journal of Hospital Infection, 2013

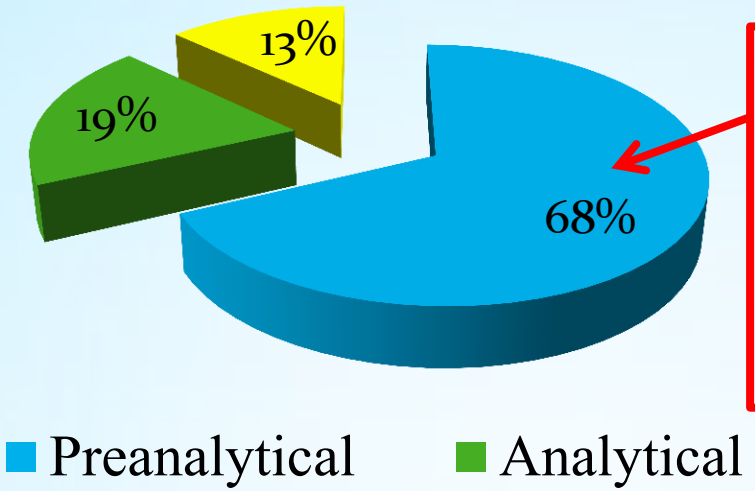
ISSUES FOR ORTHO-MICROBIOLOGISTS!

Biofilm notably hinders sampling and culturing;
Difficult to detach biofilm-embedded bacteria from prosthetic surfaces.



Up 30% of False Negative

Pre-analytical phase



Not correctly delivered
Missing patients data

Lack of standardized procedures for:

Sample collection

Storage and transport to laboratory

Infection or Contamination? Case 1.....

- 46yrs male (Shoulder prosthesis)

- WBC: 8,48x103 cells/µl – 60,1 % Neutrophils
- ESR: 7mm/hr
- CRP: 2.4 mg/L

- **Microbiology:**
- **Periprosthetic tissues**: ***Propionibacterium acnes***
- **Prosthetic implant**:
- ***Corynebacterium amycolatum, Staphylococcus simulans, Staphylococcus epidermidis***

Infection or Contamination? Case 2……

- 73 yrs male (Hip prosthesis)

- WBC: 7.83x103 cells/µl – 60,1 % Neutrophils
- ESR: 6mm/hr
- CRP: 1.2 mg/L
- Preop Fluid: culture neg. Esterase neg.

- Intraop analysis
- Articular Fluid: Esterase Neg. CRP 0,6, WBC Neg
- **Microbiology:** Biopsies Neg, Implant components Neg.
- **Articular Fluid: *Kokuria kristinae* and *Staphylococcus lugdunensis***


CLINICA
23.9.20
TENERE
GUANTI IN

BIOFILM DISSOLVING SUBSTANCE

DL-Dithiothreitol (DTT)

AMCLI GUIDELI NES

MicroDTTect

- Closed system
- To collect and treat sample in the same container
- Possibility to use the same bag for multiple samples from the same patient

«Synovial Fluid diagnosis» State of the art

- CRP poor specificity
- White Cells Count not always well performed
- WCC lacks of a general consensus
- Other Biomarkers (i.e. IL-6) far to be used in routinary settings
- <u>Leukocyte esterase very encouraging results</u>

Pros of alpha-defensin

- Easy-to-use
- Reliable and safe
- Same or superior sensitivity and specificity of frozen sections and bone scans
- Opens a new promising pathway in diagnostics using biomarkers

IMPROVEMENT of current data

- Combined data from Laboratory test (ELISA) and from POC
- Adequate Quality Control for POC Test
- Expensive?
- Scientific biases (improving number publications)

Alpha-defensin ELISA Test: Galeazzi Lab as Reference Center for South Europe

Patient:

Male – Hip revision for a suspected infection

Microbiological samples: prosthetic components and biopsies treated with DTT

Considerations:
***Alpha-Def* needs to be improved in Low-grade microorganisms**

Blood CRP: 1.7 mg/L

Synovial Fluid: Esterase: positive, BUT Alpha-defensin: negative

FINAL ADVICES

"Beyond the Clinical Simptoms"

- Lab markers (ESR, CRP)
- Hystopatology (WBCs)
- Culture

⊐ **Classic**

- Microcalorymetry
- Mass-spectrometry
- Multiplex PCR
- FISH
- Microarray

⊐ **Novelty**

- Biomarkers

IL6, Supar. TLR2, esterase, alfa-dephensin

Surgeons should know reliabilty of each diagnostic test and the respective cut-off

Better to use:

1) few but powerful tests?

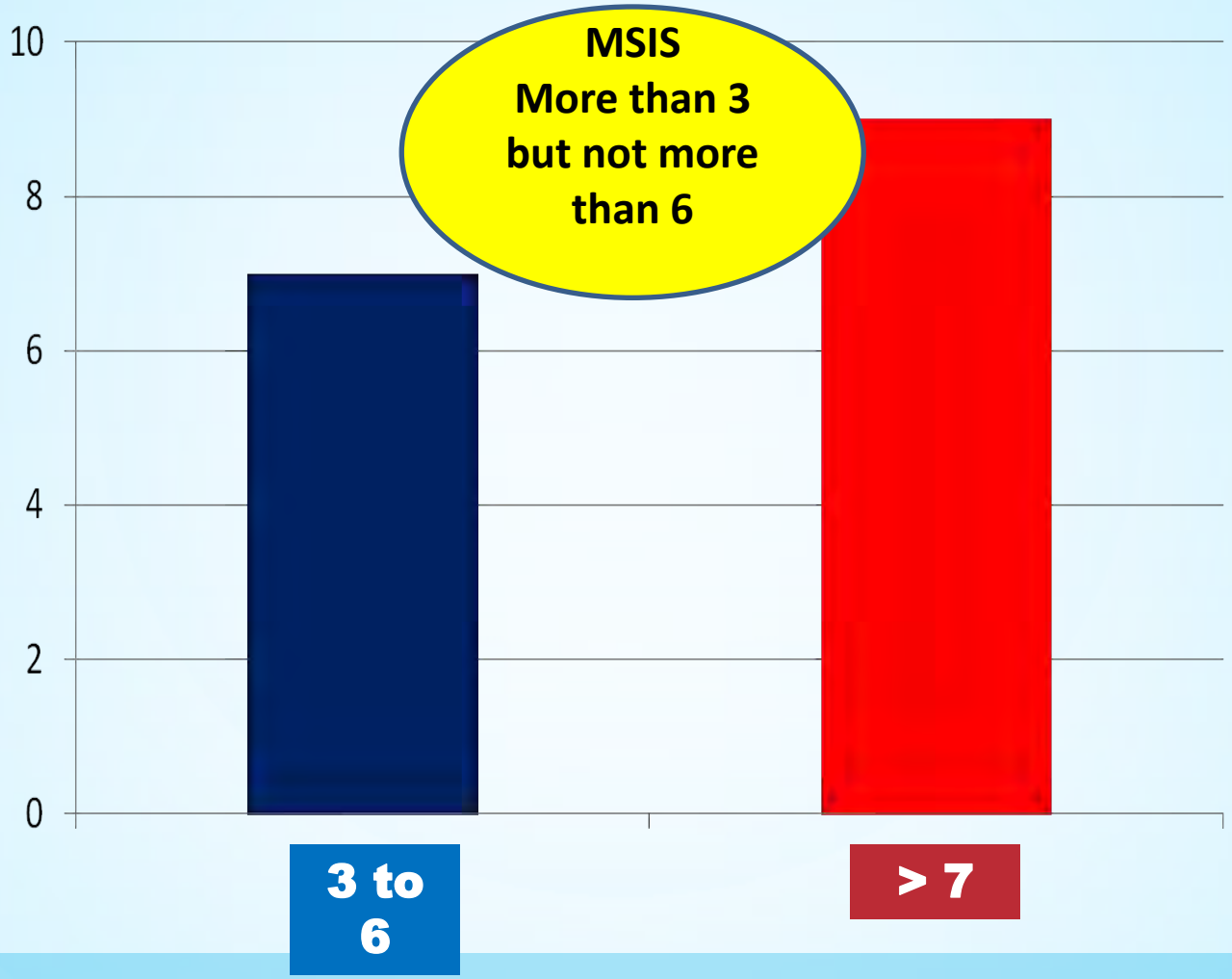
2) all the tests available in your lab?

The powerful of each test can change on the basis of:

- Infected microorganisms
- Infection site
- Immunological conditions
- Antibiotic treatment

- **Collection Samples Methodology**

How many samples (NOT Swabs) do ISOC centers usually send for cultures?



CONCLUSIONS

Microbiology is a useful tool in the hands of Surgeon

Not investigate Microbiology if you don't wish it…….but ask to your Microbiologist

Mantain good relationship with him!!

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INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Hip fracture surgery in conventional mixed use emergency theatre- Is it safe?

Sujit Agarwal, Ollie Khan, Mike Lemon

Royal Surrey County Hospital, Guildford

United Kingdom (UK)

Surgical site infection

- Catastrophe
- 11% - Following THA in standard theatre without modern aseptic precautions.
- Now reduced to 1-2%[1]

Orthopaedics only

Concerns

- No Laminar flow
- Microbial surface contamination from the previous infected case

Aim

- Is it safe to perform hip fracture surgery in a conventional mixed use emergency theatre?

Why hip fracture?

- Early surgery shown to reduce mortality and morbidity[2]
- Recommendations to operate within 24-36 hours
- Financial incentives
- Only 72% patients met the standard in the UK in 2014-15[3]
- 87% in our hospital: Use emergency theatre in case of insufficient time on dedicated trauma list.

Outcomes measured

Primary outcome

- Superficial infection
- Deep infection
- Any post-op hip swab

Surrogate outcome

- Reoperation rate
- Readmission rate
- Length of stay
- 30 day mortality

SSI in elderly- Prolongs hospital stay by 2 weeks and doubles the readmission rate[4] and multiplies mortality risk by 4 times[5].

Material & Methods

- Retrospective review of emergency theatre register and National Hip Fracture Database (NHFD)
- August 2010- July 2014
- Minimum follow up of 6 months
- Patient notes, GP discharge summaries and electronic laboratory results (wound swabs)

Material & Methods

Group A

- Operated in shared conventional theatre
- N= 74
- Mostly after a laparotomy or abscess
- Hemiarthroplasty: 60%

Group B

- Patients operated in dedicated orthopaedic theatres and laminar flow
- N=1370

- ❖ No randomisation performed but no active bias
- ❖ Both groups were similar in their age/ASA grades
- ❖ Standard theatre cleaning process & discipline and antibiotic prophylaxis in both groups

Results

Group A

- Deep infection- Nil
- Superficial infection- Nil
- Any hip swabs on Ward Enquiry Live- Nil

❖ SSI in the elderly population following orthopaedic surgery- 1.1%[5]

Results- Surrogate measures

	Group A (mixed use)	Group B (dedicated orthopaedic)	National
30 days reoperation rate	0%	0.4%	1.1% (unknown 51%)
Readmission rate	0%	Not known	Not known
Length of stay	20 days	19.4 days	19.8 days
30 days mortality	4% (3/74)	8.1% (11/1370)	8.35%

SSI in elderly prolongs hospital stay by 2 weeks and doubles the readmission rate[4] and multiplies mortality risk by 4 times[5].

Laminar Flow and Orthopaedics

- Recommended and popularised after the MRC trial- Lidwell, J Hosp Infect 1998
- Recent studies show inconsistencies and question the benefits and potential harm

Does the use of laminar flow and space suits reduce early deep infection after total hip and knee replacement?

THE TEN-YEAR RESULTS OF THE NEW ZEALAND JOINT REGISTRY

G. J. Hooper,
A. G. Rothwell,
C. Frampton,
M. C. Wyatt

From the University of Otago, Christchurch, New Zealand

We have investigated whether the use of laminar-flow theatres and space suits reduced the rate of revision for early deep infection after total hip (THR) and knee (TKR) replacement by reviewing the results of the New Zealand Joint Registry at ten years.

Of the 51 485 primary THRs and 36 826 primary TKRs analysed, laminar-flow theatres were used in 35.5% and space suits in 23.5%. For THR there was a significant increase in early infection in those procedures performed with the use of a space suit compared with those without ($p < 0.0001$), in those carried out in a laminar-flow theatre compared with a conventional theatre ($p < 0.003$) and in those undertaken in a laminar-flow theatre with a space suit ($p < 0.001$) when compared with conventional theatres without such a suit. The results were similar for TKR with the use of a space suit ($p < 0.001$), in laminar-flow theatres ($p < 0.019$) and when space suits were used in those theatres ($p < 0.001$). These findings were independent of age, disease and operating time and were unchanged when the surgeons and hospital were analysed individually.

The rate of revision for early deep infection has not been reduced by using laminar flow and space suits. Our results question the rationale for their increasing use in routine joint replacement, where the added cost to the health system seems to be unjustified.

Mixed use theatre and Orthopaedic surgery

Microbial Surface Contamination After Standard Operating Room Cleaning Practices Following Surgical Treatment of Infection

Orthopaedics 2014, Vol 4

Divisons of Orthopaedics and Microbiology & infection Control.

The Johns Hopkins University, Baltimore

9 different, reproducible surfaces were swabbed before and after every infected and clean cases.

No significant difference between the levels of surface contamination

Average of 1.4 cfu/cm^2

Mixed use theatre and Orthopaedic surgery

Primary Total Hip Replacements: A guide to Good Practice.
British Orthopaedic Association, Revised 2012

- Compared with conventional plenum ventilated theatres, ultra-clean air reduces the rate of deep infection by 2.8. Wherever possible, THR should be performed in ultra-clean air theatres
- Conventional operating theatres should be dedicated to elective orthopaedic surgery as far as possible. Ninety-five per cent of bacteria are cleared from a conventional theatre within 11 minutes. If the theatre has been used for a dirty case, at least 11 minutes should pass before a THR is undertaken.

Conclusion

Performing surgery for hip fracture in elderly in a mixed use conventional theatre – Is probably safe and avoids delays when there is no slot on dedicated theatre.

Limitations

- Small sample size
- Retrospective
- Bias
- Missed infections

Thank You

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
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26-27 NOVEMBER 2015

MILAN, ITALY

Infection Compliance
Protecting Patients, Seeking Solutions

National Joint Registry
www.njrcentre.org.uk
Working for patients, driving forward quality

Beyond Compliance
Protecting Patients, Supporting Innovation

" Infection compliance"
A possible system to link data about patients with infected joint replacements

Keith Tucker
Iain McNamara
Richard Armstrong
Martin Pickford

MILAN 2015

National Joint Registry
www.njrcentre.org.uk
Working for patients, driving forward quality

CONFLICT OF INTERESTS

- CHAIR ODEP
- CHAIR BEYOND COMPLIANCE
- MEMBER NJR IMPLANT PERFORMANCE COMMITTEE (EX CHAIR)
- I HAVE MY EXPENSES PAID FOR THE ABOVE ACTIVITIES BUT NO SALARY

- MEMBER ISAR COMMITTEE
- MEMBER ICOR COMMITTEE

- STOCK HOLDER ACCENTUS MEDICAL (AGLUNA)

Beyond Compliance
Protecting Patients, Supporting Innovation

ODEP
Orthopaedic Data Evaluation Panel

BEYOND COMPLIANCE

Beyond Compliance
Protecting Patients, Supporting Innovation

- **NJR** BASED SYSTEM INTRODUCED TO TRY AND PREVENT POOR TKRS AND THRS BEING USED EXTENSIVELY
- THE CE MARK IS COMPLIANCE
- WE HAVE GONE BEYOND COMPLIANCE
- 25+ IMPLANTS HAVE BEEN GOING THROUGH THE SYSTEM OVER THE PAST 3 YEARS

Infection Compliance

Protecting Patients, Seeking Solutions

COULD A SIMILAR SORT OF NJR BASED SYSTEM IMPROVE OUR KNOWLEDGE ABOUT JOINT REPLACEMENT INFECTION?

National Joint Registry
www.njrcentre.org.uk
Working for patients, driving forward quality

Infection Compliance

Protecting Patients, Seeking Solutions

Infection Compliance
Protecting Patients, Seeking Solutions

IS THERE A PROBLEM WITH PRESENT APPROACH TO REPORTING ON INFECTION?

- MANY UNITS REPORTING RESULTS OF LIMITED SERIES
- MANY VARIABLES
- CONCLUSIONS NOT ALWAYS STASTICALLY SOUND

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Protecting Patients, Seeking Solutions

WHAT DO WE WANT TO ACHIEVE?

- THE OUTCOMES USING AGGREGATED DATA (Would bigger numbers help)

- THE MORTALITY RATE (EARLY AND LATE)
- A BETTER UNDERSTANDING OF THE PROBLEMS
- IMPROVEMENT IN RESULTS

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Protecting Patients, Seeking Solutions

HOW MIGH IT WORK?

- UPLOAD DETAILS OF REVISION OPERATION TO NJR
- “INFECTION” TRIGGERS NJR MAIN FRAME TO CHECK HOSPITAL ID
- IF INFECTION MATCHES ID
- LIST OF FURTHER QUESTIONS SENT TO SIGNED UP SURGEON

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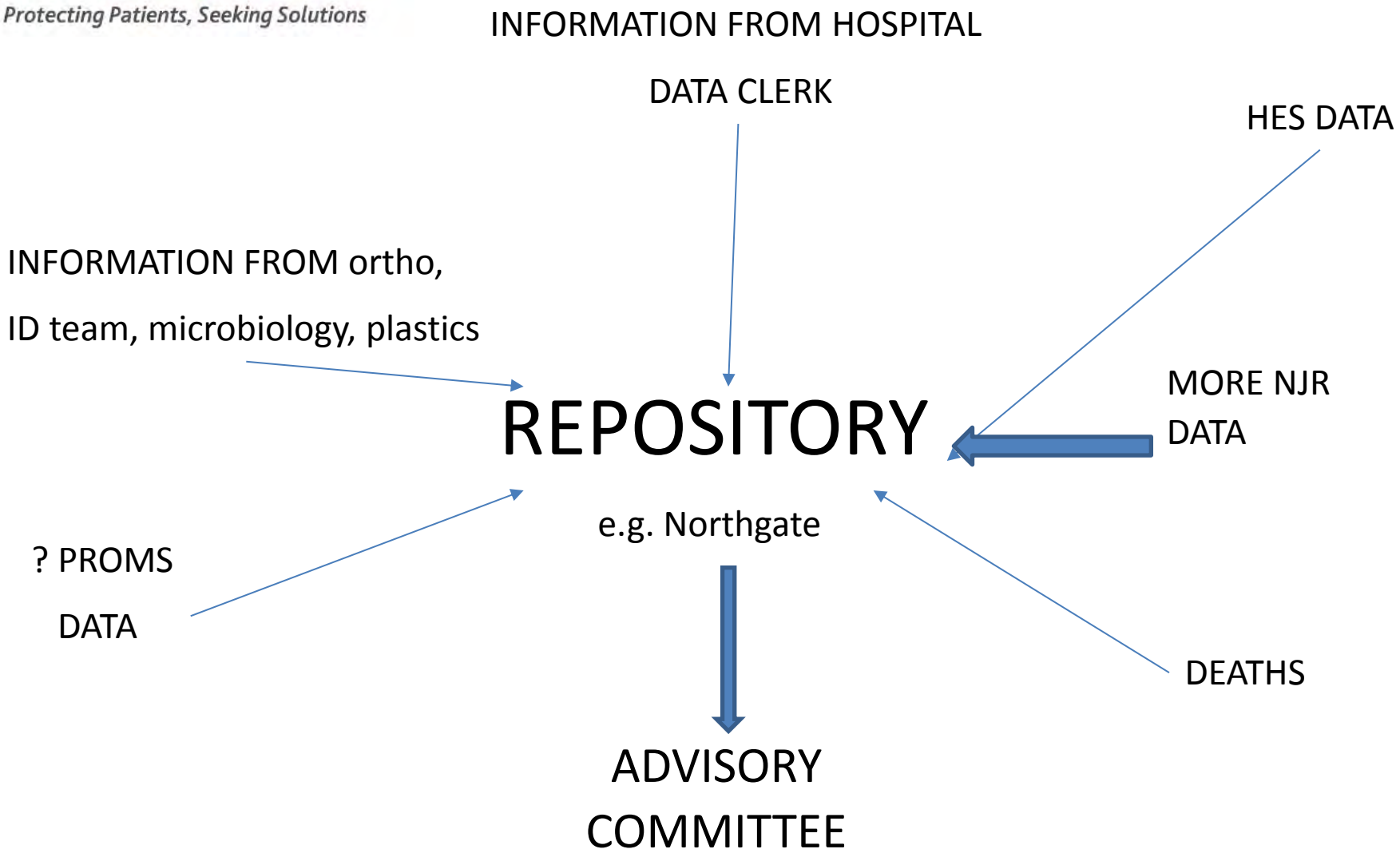
FEEDBACK

- DETAILS OF INFECTION?
- ANTIBIOTICS….. HOW LONG, WHICH ONE?
- PATHOLOGY ?
- TREATMENT PLAN ?
- ETC

SUGGESTED SET UP



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FEEDBACK

- ONGOING QUESTIONNAIRES SENT OUT AUTOMATICALLY
- PROGRESS
- FURTHER SURGERY
- PROMS
- ETC

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CONSENT AND ETHICS

- CONSENT TO THE USE OF DATA BY ADVISORY GROUP

- THIS WILL BE A SERVICE EVALUATION….

  ETHICS NOT REQUIRED

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THE ADVISORY GROUP SUGGESTED RESPONSIBILITIES

- DETERMINE THE QUESTIONS
- INTERROGATE THE OUTPUT
- SUPPORT A STAKEHOLDER COMMITTEE
- PUBLISH THE RESULTS

FOR BC THIS HAS MEANT INVOLVING SOME VERY DEDICATED PEOPLE

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What would you sign up to?

- COLLECTING AGREED DATA
- CONTINUING TO COLLECT DATA
- MAKING YOUR DATA AVAILABLE
- TAKING PART IN THE ANALYSIS
- MAKING SURE OF PATIENT'S CONSENT

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COST AND FUNDING

- IT WILL COST MONEY-but has the potential to save £millions over time
- SET UP COST – to establish the service **APPROXIMATELY £35K**
- RUNNING COST – to provide ongoing data collection, reporting and oversight
- GRANTS WILL BE REQUIRED

National Joint Registry
www.njrcentre.org.uk
Working for patients, driving forward quality

ACKNOWLEDGEMENTS

RICHARD ARMSTRONG (Northgate)

MARTIN PICKFORD (ODEP, NJR, BHS)

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Infection Compliance

Protecting Patients, Seeking Solutions

HOW DO WE WANT TO ACHIEVE OUR GOAL

MAKE IT EASY!

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MILAN, ITALY

Gemelli

Fondazione Policlinico Universitario A. Gemelli
Università Cattolica del Sacro Cuore

Analysis of the risk factors predisposing to periprosthetic hip infection and treatment options.

F.Donati, M. Fantoni, M. Saracco, G. Cerulli, G. Logroscino*

Orthopaedics Institute, Catholic University of the Sacred Heart, Rome
*Clinical Infectious Diseases Institute, Catholic University of the Sacred Heart, Rome

Introduction

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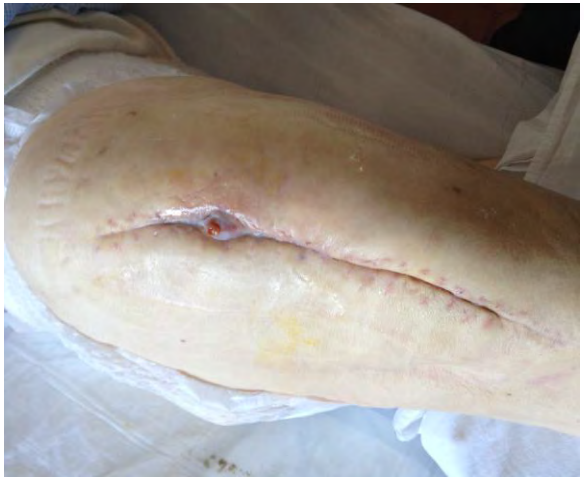
Periprosthetic infection is one of the most difficult and expensive complications in hip surgery



Overall risk of infection after THA

0.5% - >4%

Hereing et al. 2012

Purpose:

To define the risk factors predisposing to infection and the most effective treatment protocol.

Materials & metods

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In 2013 a Gemelli Hospital Hip Arthroplasty Register was created, including all the patients with total hip arthroplasties visited by a single surgeon (G.L.) in our outpatient clinics.

- **Individual patients' data**

(age, sex, diagnosis, concomitant disease, BMI, surgical technique, side, implant type)

- **Patient-reported clinical outcome**

(HHS, VAS, SF-12 and Womac Score)

- **Radiographic and hematological exams are recorded at each follow up**

- **Complications and re-operations rate**

giulio	85,47945205	MASCHIO	2,2	32,1	INFEZIONE ATA	SX
luciana	72,68767123	FEMMINA	13,5	24,2	INFEZIONE ATA	SX
vilma	84,8	FEMMINA	18,1	29,4	INFEZIONE ATA	DX
gino	52,05479452	MASCHIO	99,8	24,2	INFEZIONE ATA	SX
matilde	79,95342466	FEMMINA	7,8	22,9	INFEZIONE ATA	SX
franco	61,69589041	MASCHIO	24,2		INFEZIONE ATA	SX
antonio	85,74246575	MASCHIO	42,7	23,7	INFEZIONE ATA	DX
antonio	69,84931507	MASCHIO	15,8		INFEZIONE ATA	DX
donato	79,4630137	MASCHIO	0,0	23,5	INFEZIONE ATA	DX
chantal	66,18082192	FEMMINA	11,7	23,1	MOBILIZZAZIONE STELO	DX
mirella	67,67945205	FEMMINA	7,8	23,2	INFEZIONE ATA	DX
lisena	81,42191781	FEMMINA	40,9	18,4	INFEZIONE ATA	SX
nicola	52,26027397	MASCHIO	6,0	20,6	INFEZIONE ATA	DX
maria	58,26849315	FEMMINA	23,5	37,6	INFEZIONE ATA	SX
sergio	60,76164384	MASCHIO	15,7		ARTRITE SETTICA ANCA	DX
natale	72,71232877	MASCHIO	15,2	24,2	INFEZIONE ATA	DX
concetta	82,89589041	FEMMINA	10,8		LUSSAZIONE ATA	SX
sandra	43,52876712	FEMMINA	5,0	19,6	INFEZIONE ATA	SX
theresia	74,24383562	FEMMINA	32,4	22,9	INFEZIONE ATA	SX
dina	76,7369863	FEMMINA	1,5		ARTROSI PRIMARIA	DX
Guido	65,73424658	MASCHIO	86,3		usura inserto	DX
rosa	66,32876712	FEMMINA	35,1	30,8	MOBILIZZAZIONE COTILE	SX
gino	52,05479452	MASCHIO	99,8	24,2	INFEZIONE ATA	SX
rita anna	70,92328767	FEMMINA	28,4		ARTROSI PRIMARIA	DX
vittorio	71,57260274	MASCHIO	29,8	24,8	ARTROSI PRIMARIA	DX
teresa	81,95342466	FEMMINA	5,0	26,0	ARTROSI PRIMARIA	SX
franco	61,69589041	MASCHIO	24,2		INFEZIONE ATA	SX

Materials & metods

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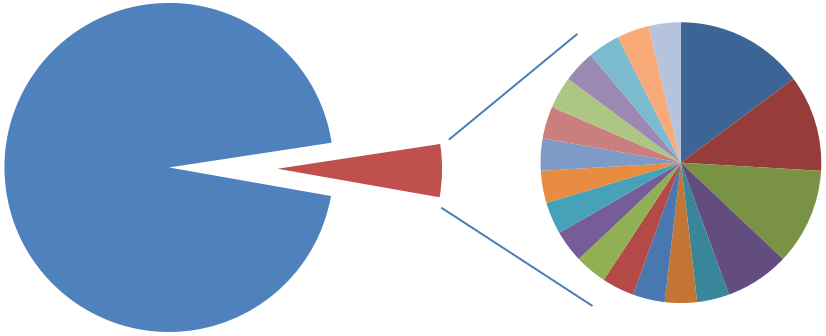
2013 – 2015

- **521 Patients with THA implanted in different centers by different surgeons**
  - **76.1% implanted in our hospital (5 infections / 396 THA)**
  - **23.9% coming from other hospital on average 6.8 months post op (22infections / 125THA)**

521 screened patients



- **Combined Orthopedic + Infectious disease ambulatory**

27 cases of infection treated

….from 19 Italian Hospital

Statistical analysis to identify risk factors and to obtain indications about the most effective treatment options adopted.

Materials & metods

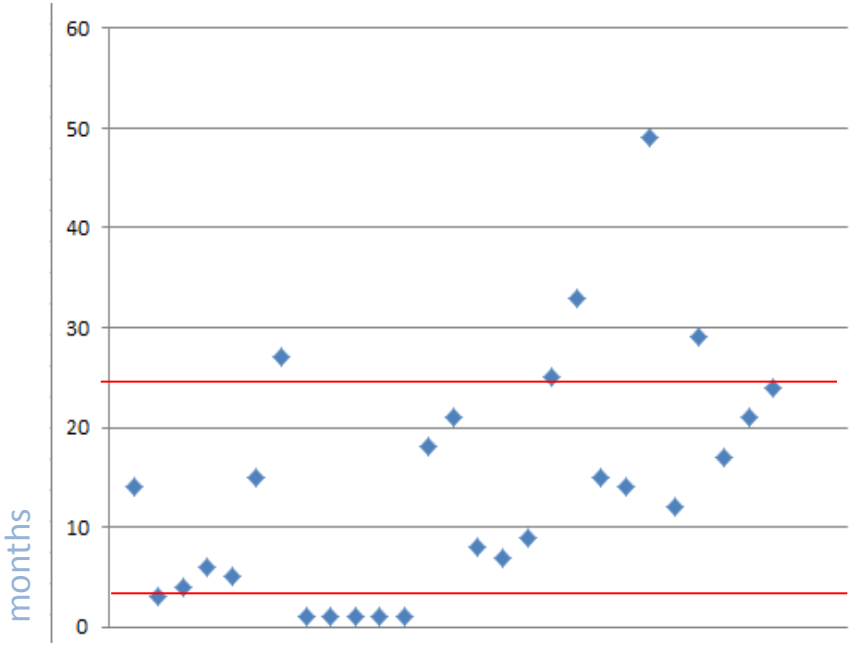
- 27 deep or superficial cases of infection (5,2%)

- Classified by Coventry classification (based on timing of presentation)

Type 1 (Early) Infection occurring in the first 30 days post surgery.

Type 2 (Subacute) Infection occurring at a period of 3-24 months after surgery.

Type 3 (Late) Infection occurring later than 24 months after surgery.



Coventry 1975

Results

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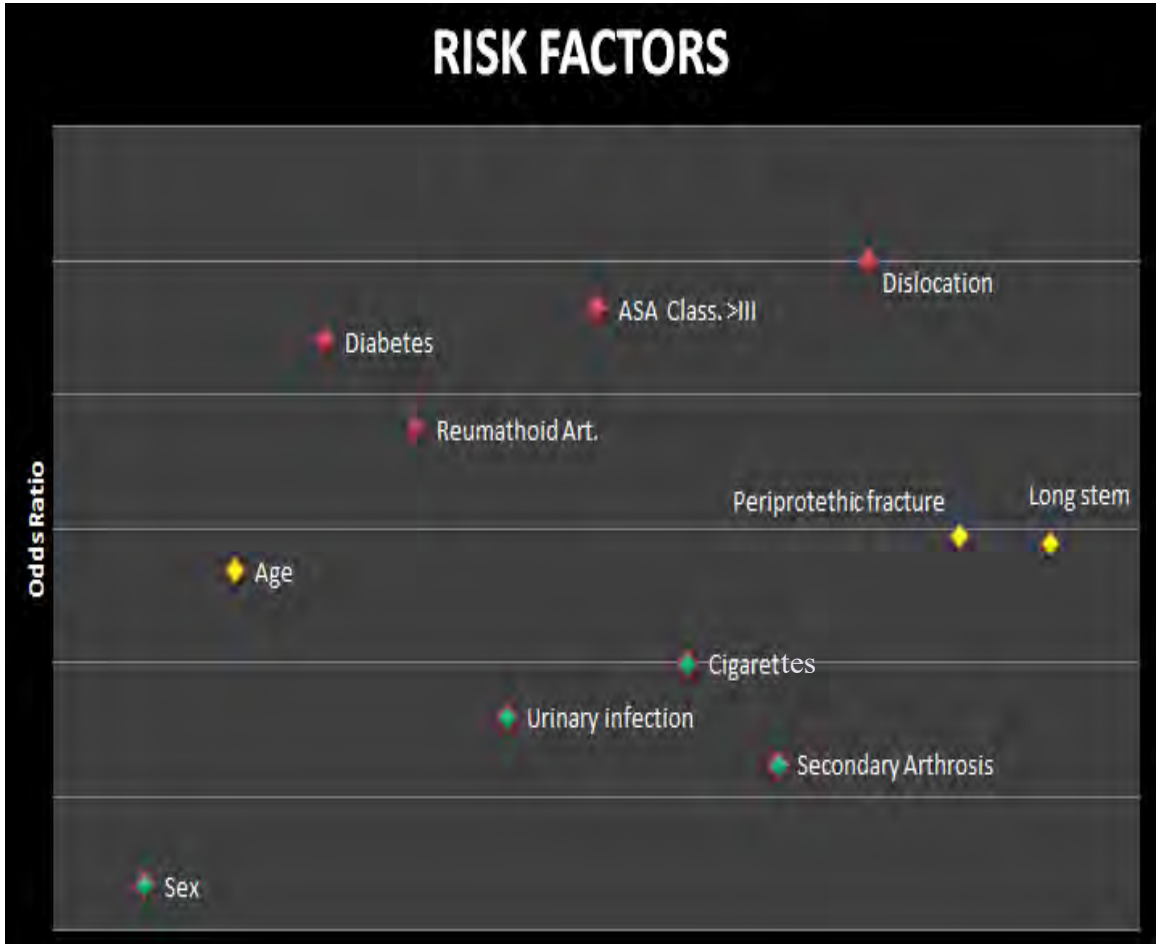
Prognostic factors

- Prosthetic dislocation (8 cases)
- ASA classification (18 ASA III)
- SevereDiabetes(4 cases)
- Rheumatoid Arthritis (3 cases)

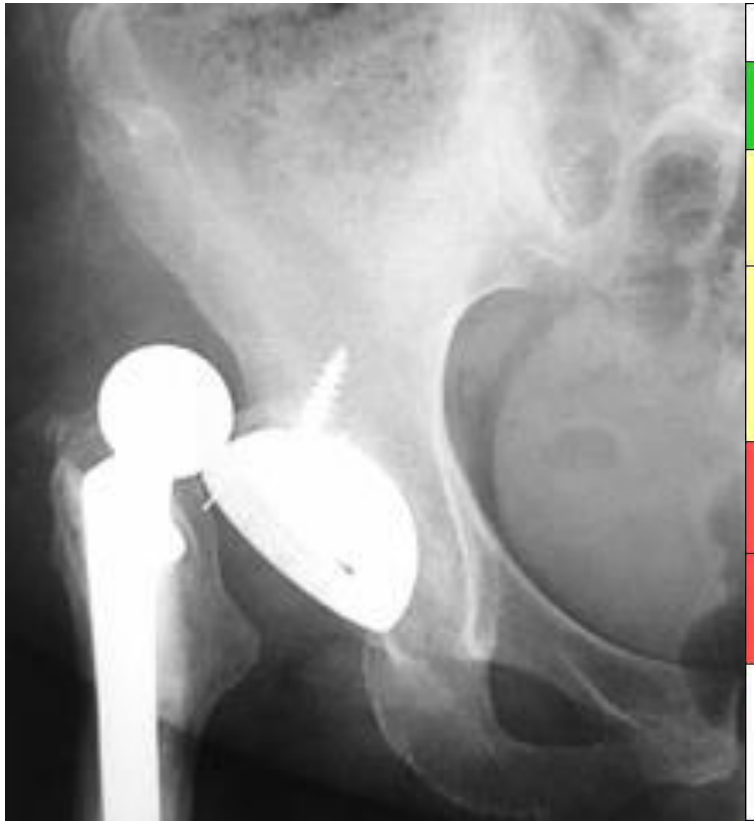
- Periprosthetic fracture (2 cases)
- Long stem
- Age > 75 YO (17 cases)



No statistically significant in multivariate analysis
More cases needed for definitive results

Observation

- Dislocation episode
- ASA Classification >III



ASA Classification		Examples:
ASA I	A normal healthy patient	Healthy: no smoking, no or very minimal drinking.
ASA II	A patient with mild systemic disease	Smoker; more than minimal drinking; pregnancy; obesity; well controlled diabetes, well controlled hypertension; mild lung disease.
ASA III	A patient with severe systemic disease, not incapacitating	Diabetes, poorly controlled hypertension; distant history of MI, CVA, TIA, cardiac stent; COPD, ESRD; dialysis; active hepatitis; implanted pacemaker; ejection fraction below 40%; congenital metabolic abnormalities.
ASA IV	A patient with severe systemic disease that is a constant threat to life	Recent history of MI, CVA, TIA, cardiac stent; Ongoing cardiac ischemia or severe valve dysfunction; implanted ICD; ejection fraction below 25%.
ASA V	A moribund patient who is not expected to survive without the operation	Ruptured abdominal or thoracic aneurism; intracranial bleed with mass effect; ischemic bowel in the face of significant cardiac pathology..
ASA VI	A patient who has already been declared brain-dead and whose organs are being removed for transplant.	

Treatment

Gemelli
Fondazione Policlinico Universitario A. Gemelli
Università Cattolica del Sacro Cuore

Early on-set Infections : 5 cases diagnosed and treated < 4 weeks post op.

- **Open debridment and wash out**
- **Prosthetic head and liner substitution, stem revision**
- **Specific antibiotic therapy under infectious disease consultant control**

- **Periodical follow up: only 1 of these cases needed a 2-stage THA revision.**

- Good resolution with debridment, wash out and ev. 1-stage revision

- 2-stage revision post debridment

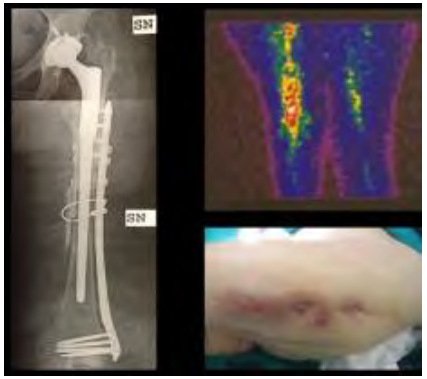
Treatment

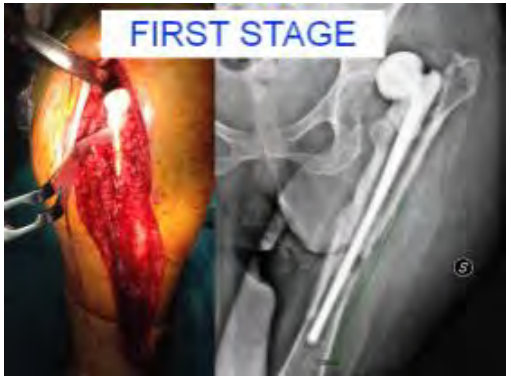
Subacute and Late on-set infections

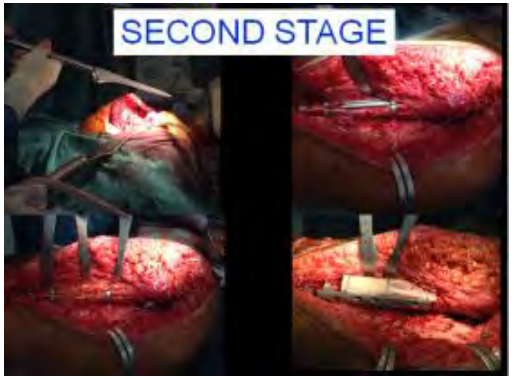
22 Patients (average time from primary implant = 16.8 months)

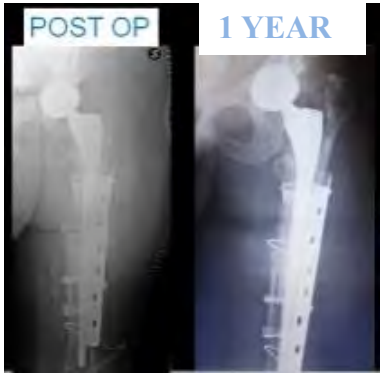
- **2-stage revision**

  Gold Standard (82% - 96% resolution) *Chen et al. 2015*









Treatment

Gemelli
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Università Cattolica del Sacro Cuore

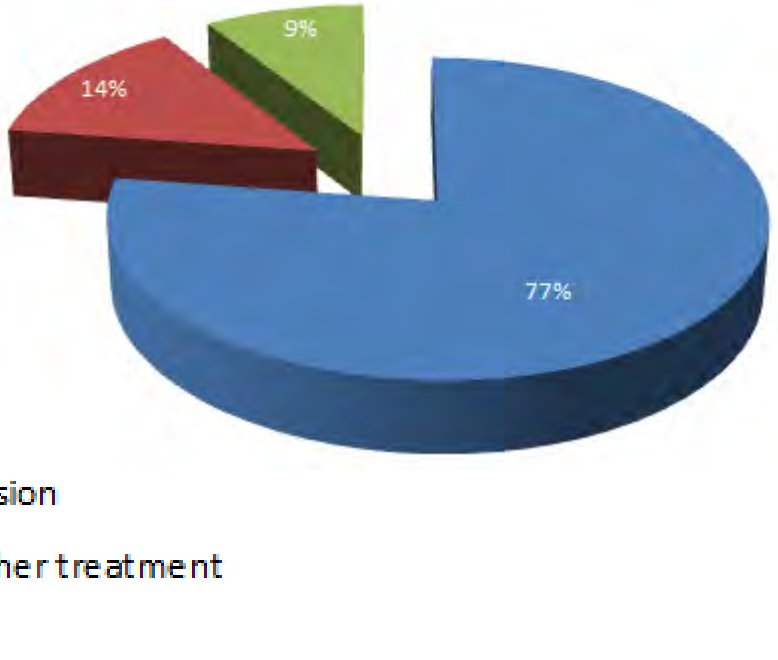
Subacute and Late infections

- Follow up= 11.4 months

23% needed associated procedure for resistent infection

- 3 spacer re-revision and debridment
- 1 hyperbaric therapy (good result)
- 1 VAC therapy

- No decease after revision surgery



- **2 Girdlestone Procedure**

Discussion

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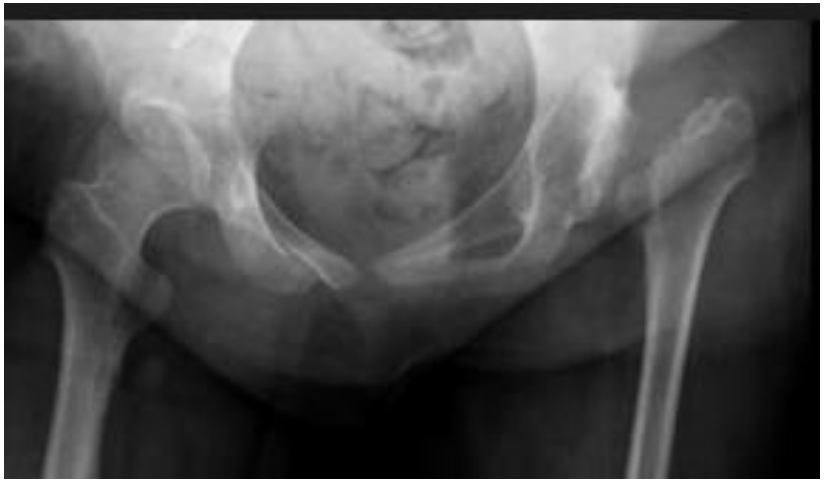
Università Cattolica del Sacro Cuore

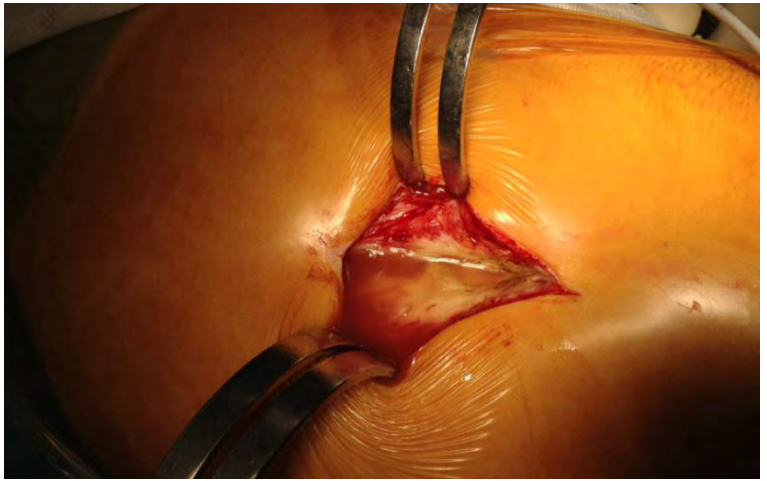
- 90.9 % good result

  2-stage revision is confirmed as gold standard treatment in association with antibiotic therapy

- 2 Failures both in patients affected by severe insulin-dependent diabetes

- Remove all metalwork and antibiotic therapy!





Conclusion

Gemelli
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Università Cattolica del Sacro Cuore

- Be careful to dislocation episodes and to patients in poor general condition
- Early follow-up (2-4 weeks post op)
- In early on-set infection: Debridment + specific antibiotics (infectious disease expert consultant)
- Subacute and late infections: 2-stage revision
- Severe Diabetes: risk factors for unsuccessful revision surgery

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Acute Late Infection in Metal-on-Metal Hip Arthroplasty: Another Severe Complication?

Rory Macnair, Scott Parker,

Elizabeth Clatworthy, Marci Maheson, Harriet Hughes, Alun John, Stephen Jones

Cardiff, United Kindom

GIG CYMRU NHS WALES

Bwrdd Iechyd Prifysgol Caerdydd a'r Fro

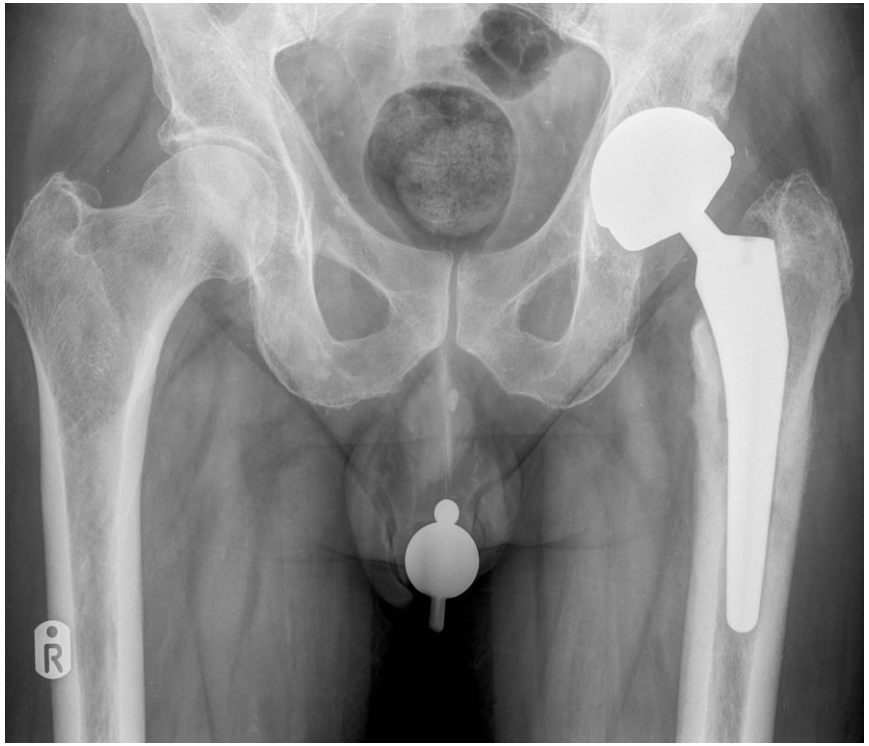
Cardiff and Vale University Health Board

BRITISH HIP SOCIETY

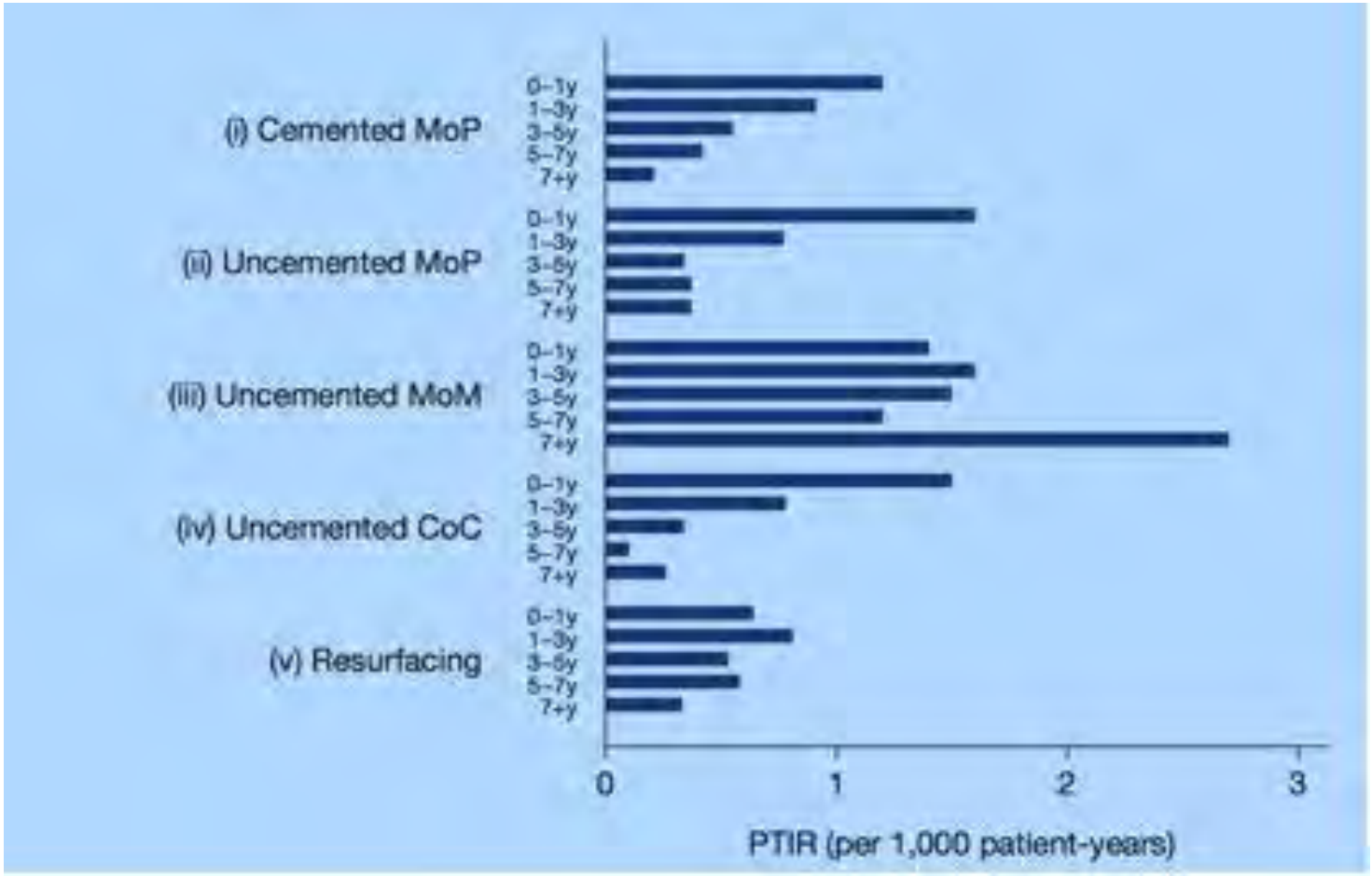
SOCIETÀ ITALIANA DELL'ANCA

Background

- Large Metal on Metal (MoM) cohort
- Increasing numbers of infection
- Severe and acute late presentation



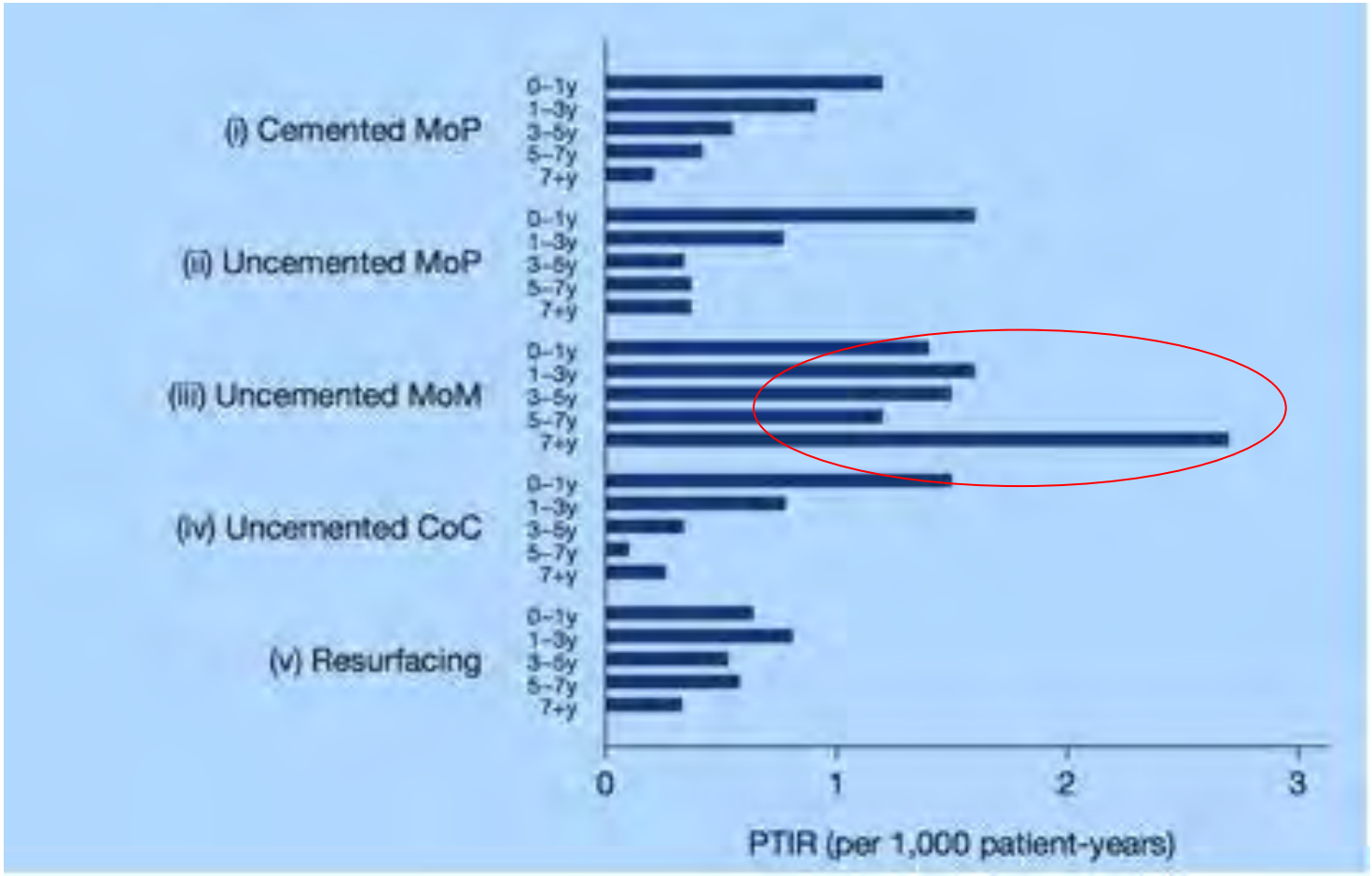
NJR 11th Annual report 2014 [1]



Change in Patient-Time Incidence Rate (PTIR) from operation

1. 12th Annual Report 2015. National Joint Registry for England, Wales, Northern Ireland and the Isle of Man

NJR 11th Annual report 2014 [1]



Change in Patient-Time Incidence Rate (PTIR) from operation

1. 12th Annual Report 2015. National Joint Registry for England, Wales, Northern Ireland and the Isle of Man

Methods

- Retrospective review (2010-15)
- Acute onset infection
- > 1 yr after MoM arthroplasty

  - Implant
  - CoCr
  - MRI
  - ALVAL
  - Microbiology
  - Surgical management
  - Complications / ITU

Patients

- 16 cases
- 66 years (51-75)
- 9 F : 7 M
- 14 THR : 2 resurfacings.
- 11 unilateral : 5 bilateral MoM
- 5.5 years until presentation (1 – 10.8)
- 11 hips no pain
  - 3 ARMD; 6 CoCr > 7μg/L

Day	Case 7: awaiting revision. Co 2.95, Cr 1.66	CRP
1	Hip pain +. Attended ED. No trauma, fever	10
3	Hip pain ++. Transfer elective centre for early revision	
5	Septic. Hip aspirate, Blood cultures. Vancomycin & Meropenem	377
6	ITU admission. AKI, spreading cellulitis. Poor pain control	
6	MSSA hip aspirate & blood culture. Flucloxacillin	
8	Clinical deterioration. Washout & removal implants.	141
11	1st stage revision with Prostalac spacer	177
15	Discharged ITU	64
39	Discharged home on oral flucloxacillin & clindamycin	32
108	Repeat 1st stage - MSSA +ve blood culture	60
318	2nd stage revision. No growth on all cultures	7
349	Discharged	16
4yrs	Remains well & symptom free	

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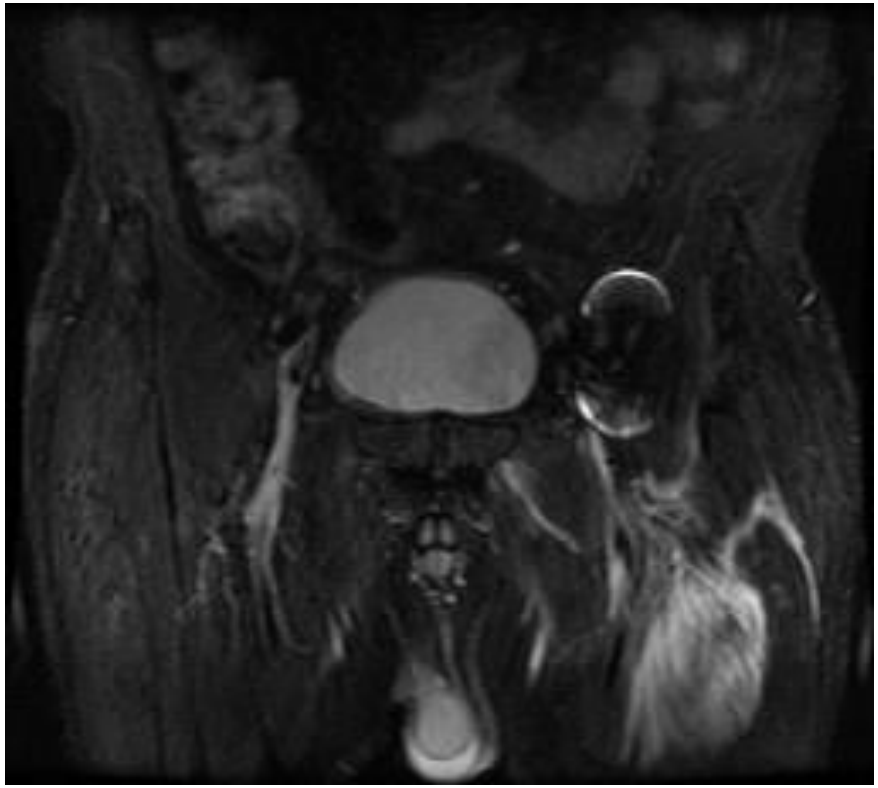
4yrs	Remains well & symptom free	

Presenting symptoms

- Pain +++
- CRP not always raised
- Rapidly become septic
- Ileus
- Imaging
- Not related to CoCr or previous MRIs



Surgery

• Days to 1st washout	4 (1-22)
• ITU admission	50%
• Multiple washouts	12 required > 2 prior to 2nd stage
• 2nd stage	208 days (64-692)
• ALVAL	9 / 13

Mortality

- 2 recent deaths
- 72 yr female
  - MSSA
- 48 yr female
  - MRSA, Streptococcus

Microbiology

Blood Cultures

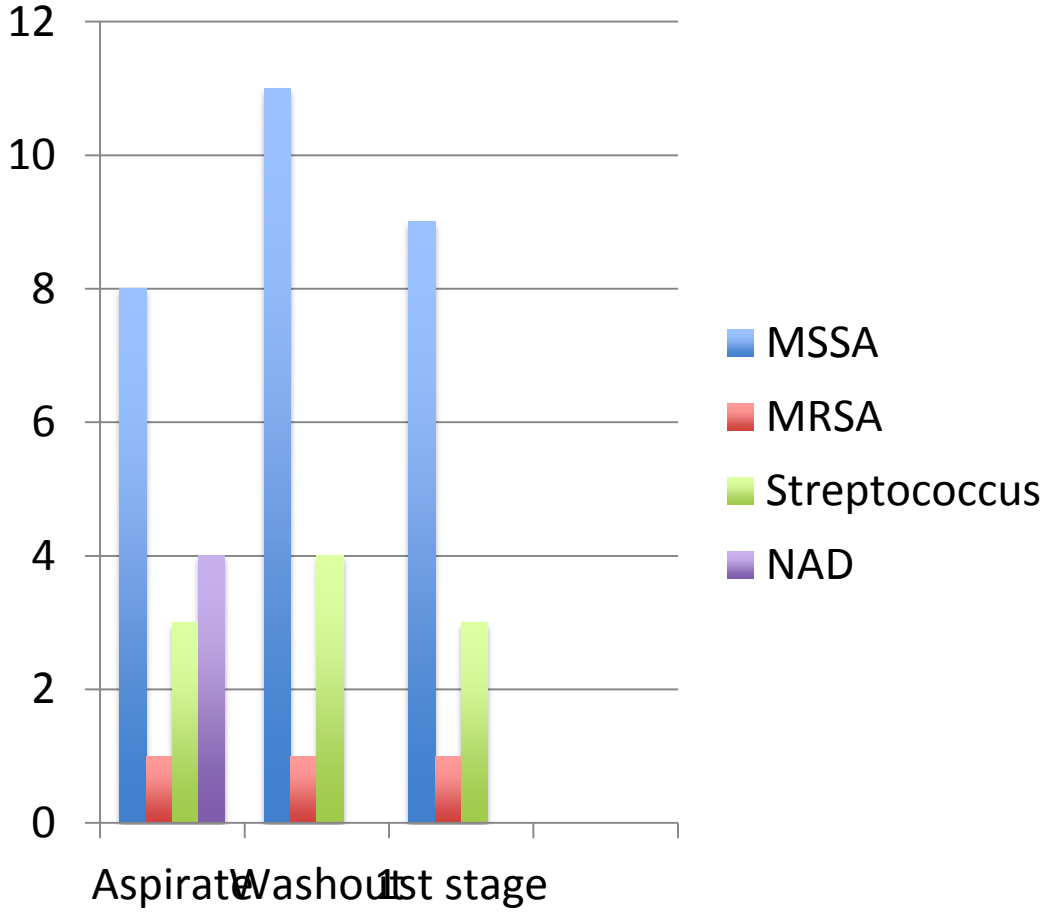
MSSA

No Growth

Not done

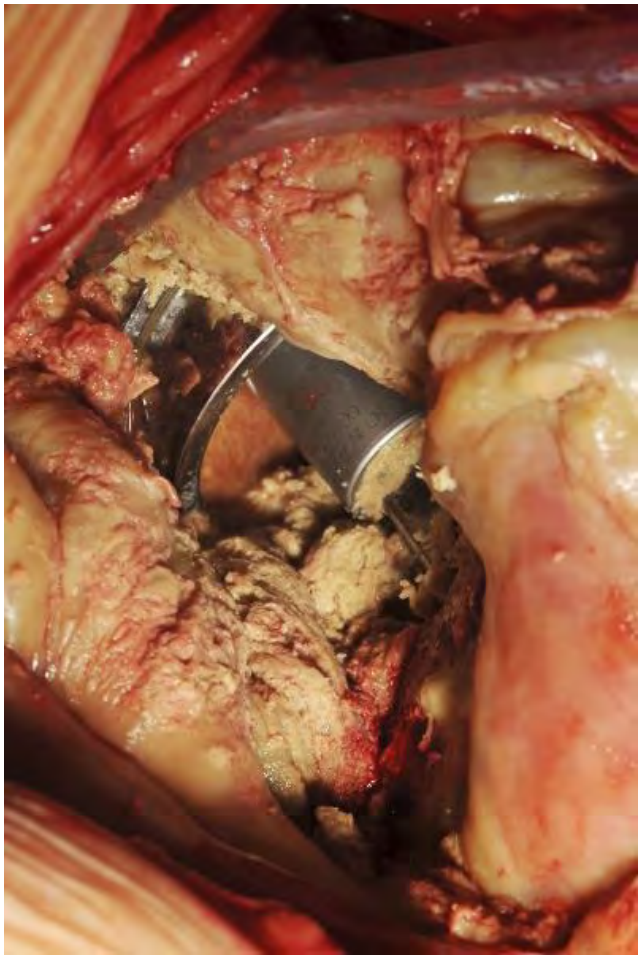
Strep Mutans

Grp F Strep



Discussion

- Particulate debris
- Molecular effects Co/Cr
- Decreased resistance
- Increased bacterial adhesion



Conclusion

- Early diagnosis & surgery
- Presenting symptoms
  - pain, CRP
- Satisfactory hips
- Severe delayed infection
- Mortality

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

The Mid Yorkshire Hospitals NHS
NHS Trust

Synovasure™ PJI

Are we really sure?

Miss Ellen Martin – St4
Mr Faisal Qamar – Arthroplasty Fellow

A Ng, L Koch, A Shetty

Mid Yorkshire Hospitals NHS Trust

BHS / SIDA – Milan, 27th November 2014

Background

- Prosthetic Joint infection (PJI) is a serious complication of arthroplasty
- Large volume of revision surgery undertaken locally for painful prosthetic joint
- Excluding PJI essential in management – Gold standard 2 stage revision for clearly infected cases
- Single stage surgery – infection often not clear
  - Sample of synovial fluid sent for MC&S as part of workup for painful prosthetic joint

Background

- Synovasure test based on synovial fluid biomarker *Alpha Denfensin 1*
- Alpha Defensin 1 is an antimicrobial peptide made by neutrophils as part of host innate immune response to pathogens
- Interact with bacterial cell wall and kill cells
- Not elevated by other inflammatory condition
- Not affected by biofilm

Background

- Study of 158 patients when samples sent to lab for Alpha Denfensin 1 testing
  - Sensitivity = 97%
  - Specificity = 96%
    - For detecting prosthetic joint infection
- Now have access to “on table” test


Synovasure®
PJI
ID:
Date:
C
a-D

Method

- 22 cases of aspiration of painful prosthetic joint aspiration as workup for revision surgery

- Aspiration in laminar flow theatre, under aseptic conditions
- Synovasure test performed
- Fluid sent to microbiology lab in clean “white-topped” bottle and blood culture bottles

Results

- 22 joints (21 patients)
- 1 patient excluded due to invalid synovasure

- 21 Joints included (20 patients – 8M, 12F)
  - 3 THR
  - 18 TKR

- 4 Acute presentations

Results

- Synovasure Positive
  - 10/21
    - 4 positive on culture
    - 6 negative on culture

- Synovasure Negative
  - 11/21
    - 10 negative on culture
    - 1 positive on culture
      - Neg synovasure but clinically infected

Sensitivity (true positive rate)

= 80%

Positive Predictive Value – 40%

Specificity (true negative rate)

= 62.5%

Negative Predictive Value – 91%

Results

	Microbiology Positive	Microbiology Negative
Synovasure Positive	4/21	6/21
Synovasure Negative	1/21	10/21

- 14/21 Synovasure tests correlated with microbiology culture
- Overall Accuracy = 67%

Results

	Growth	No Growth	No Samples Sent
Single Stage Revision	3	2	2
1st Stage Revision	1	4	

No Revision	5
Acute Presentation	4

Discussion

- How do we use Synovasure in clinical practice?
  - How do we define PJI in our clinical practice?
  - Presence of micro-organisms on fluid/tissue culture?
  - Is this a poor test? Or poor microbiology?
  - Does a positive Synovasure influence our practice?
    - Single or staged revisions? Negative Synovasure – no need to send microbiology samples?
  - Approx £500 per test – Cost effective in DGH?

Discussion

- In Original White Paper – PJI identified by MSIS criteria
- 1. Sinus tract communication with prosthesis; or
- 2. Pathogen isolated by culture from 2 separate tissue or fluid samples; or
- 3. 4 out of 6 criteria:
  - A – Elevated ESR or CRP
  - B – Elevated Synovial WCC
  - C – Elevated Synovial neutrophil percentage
  - D – Presence of purulence in the affected joint
  - E – Isolation of microorganism in 1 fluid/tissue culture
  - F - > 5 neutrophils per high power field on histology

- *White Paper – A New Paradigm for the Diagnosis of Periprosthetic Joint Infection. 11th Sept 2013. CD Diagostics*

Limitations

- Small Sample of patients – Sensitivity and specificity – large variation in confidence interval
  - Sensitivity – 80% (CI – 28.36% - 99.49%)
  - Specificity – 62.5% (CI – 35.43% - 84.80%)
- May not be inclusive of all Synovasure tests done within unit
- Management often based on clinical judgement

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

The Outcome of Two-Stage Revision for Infected Total Hip Arthroplasty in a Tertiary Centre

V Punjabi
M S Ibrahim
F S Haddad

University College London Hospitals
NHS Foundation Trust

Disclosures

Editor in Chief:

Bone & Joint Journal

I receive Royalties from:

Smith & Nephew

Corin

MatOrtho

I receive Institutional and Research Support from:

Smith & Nephew

Stryker

Corin

MatOrtho

NIHR

Introduction:

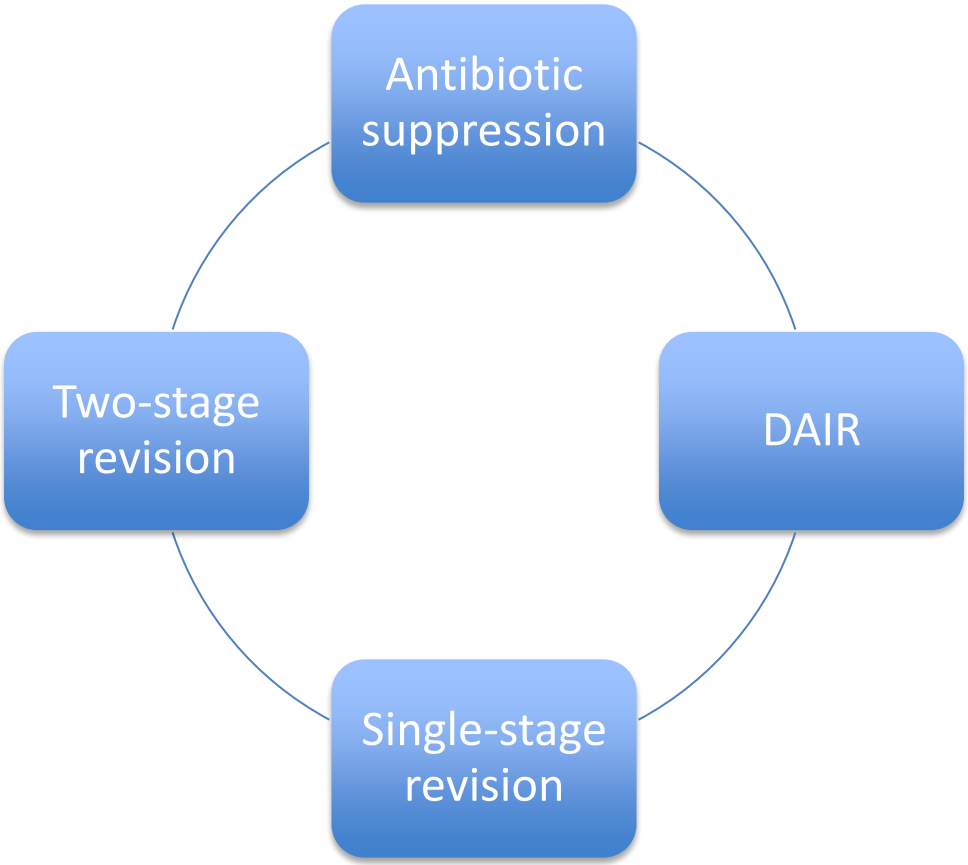
PJI --- Devastating complication --- patient & surgeon

Psycho social & financial implications on patients & health care industry

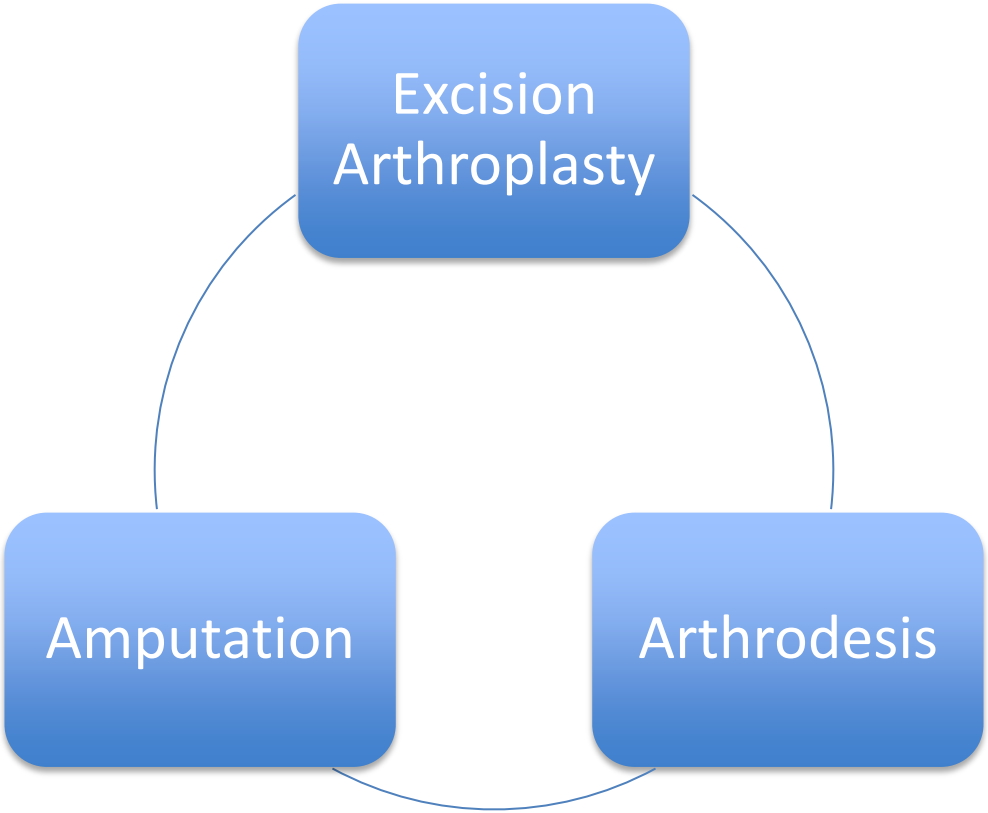
In US --- $ 566 million (2009) --- projected $ 1.62 billion (2020)**

**Kurtz SM, Lau E, Watson H, Schmier JK, Parvizi J. 2012. Economic burden of periprosthetic joint infection in the United States. J. Arthroplasty 27:61– 65.e61

Treatment Options:



Other options:



Purpose:

To report the outcome of a two-stage revision for infected THRs

Minimum five years follow-up

Method:

Ethics approval

Prospective study

125 consecutive patients (51 M & 74 F)

Two-stage revision THR over a 8 year period

Single surgeon (FSH) tertiary centre

Mean age 68 years (42 to 78)

Mean follow-up was 8.6 years

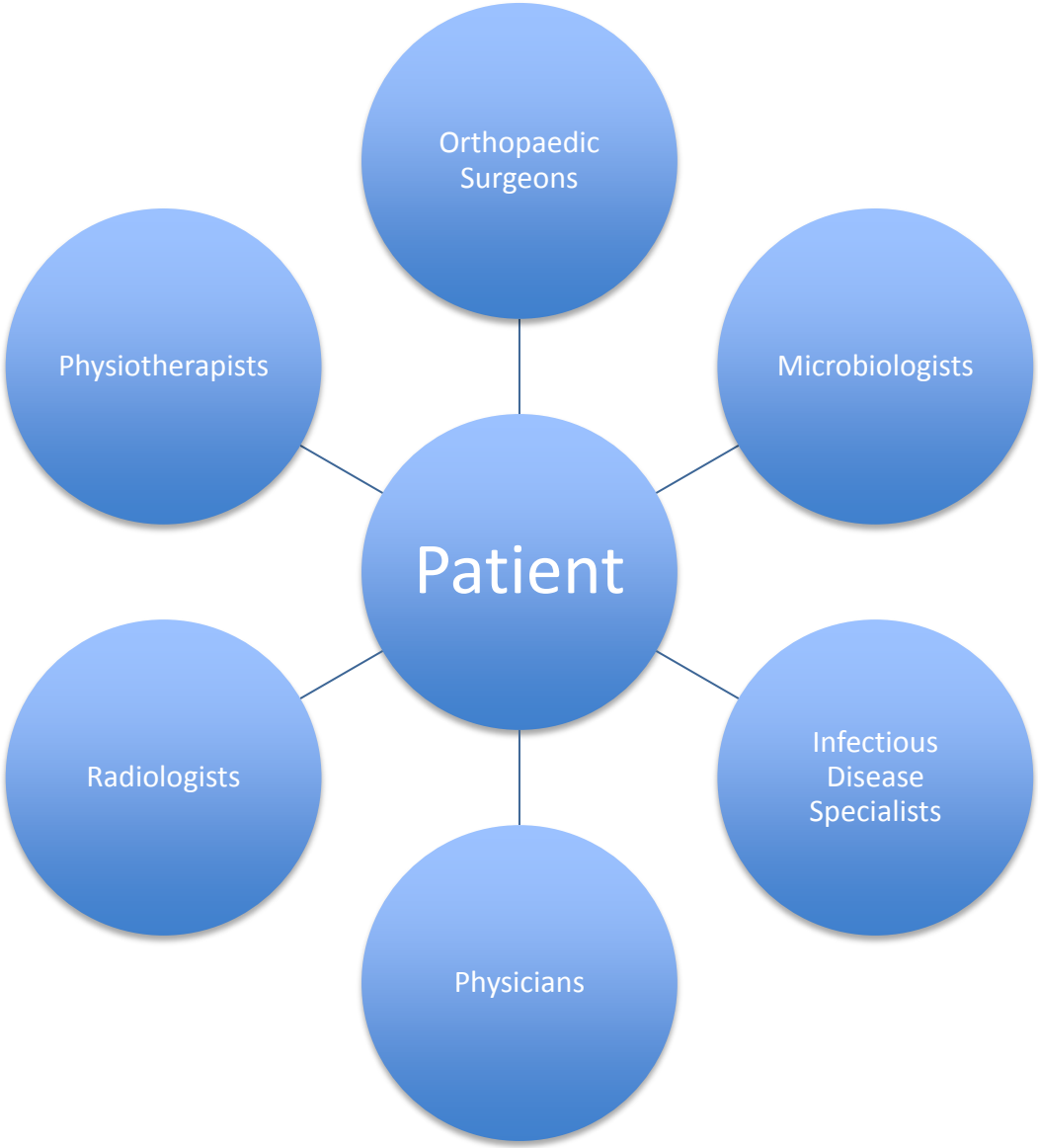
Inclusion criteria:
Infected primary or revision THR

Exclusion criteria:
Single stage revision
Failed previous two-stage revision for infection elsewhere

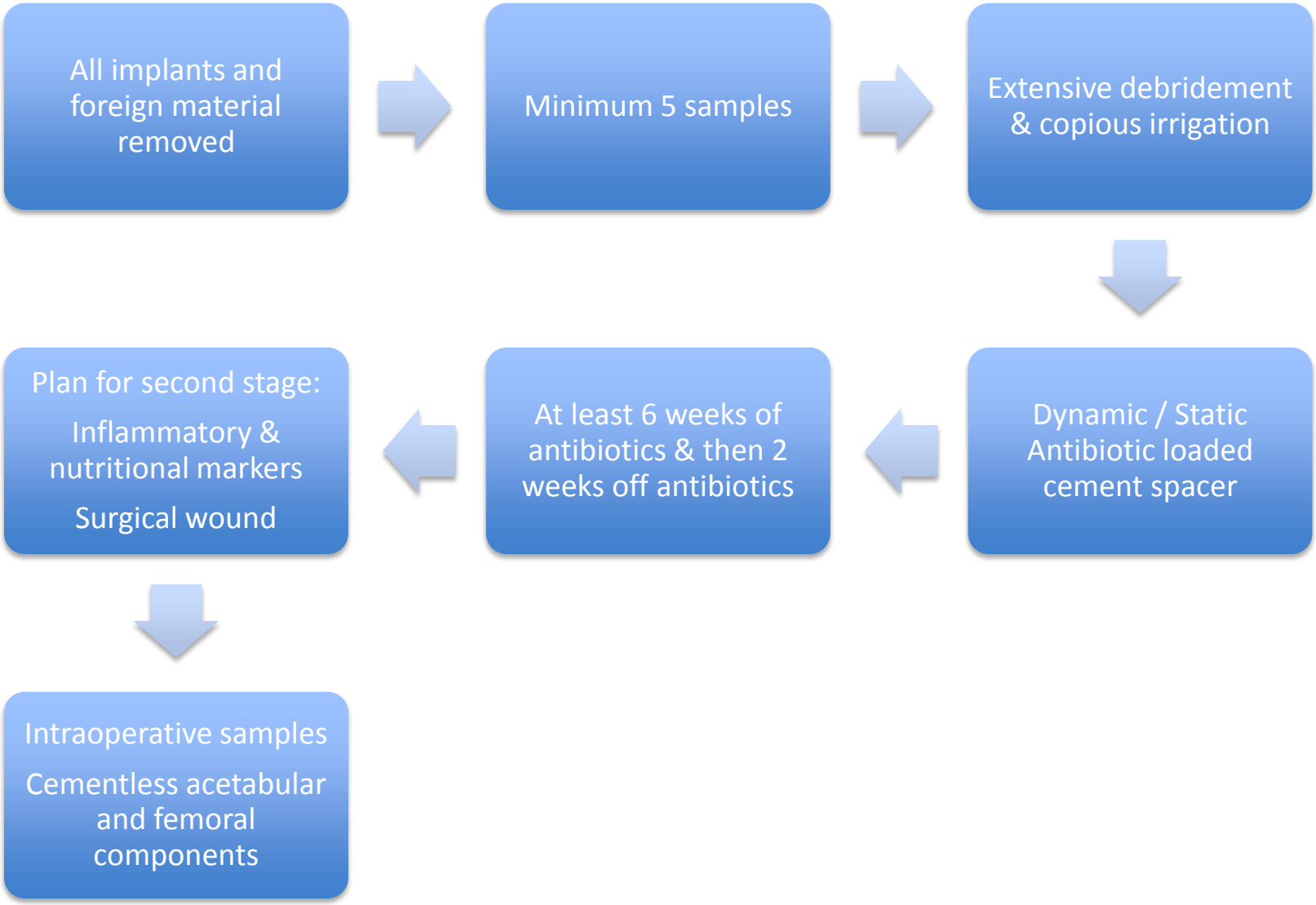
Selective strategy – Patient stratification

Diagnosis:
History
Examination
CRP > 10 mg/L & ESR > 30 mm/hr * (*MSIS group)
Hip aspiration

MDT Approach:



Operative Technique:

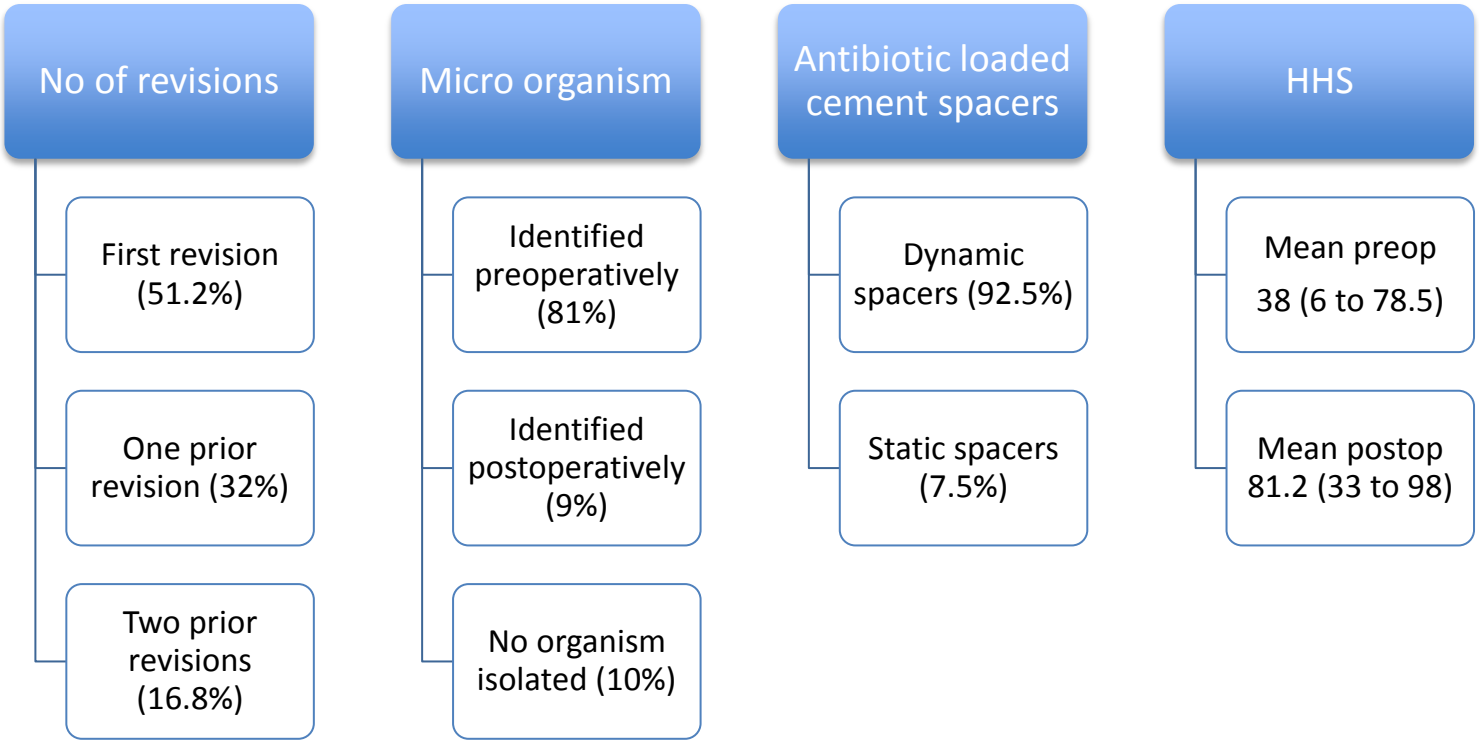


Followup:

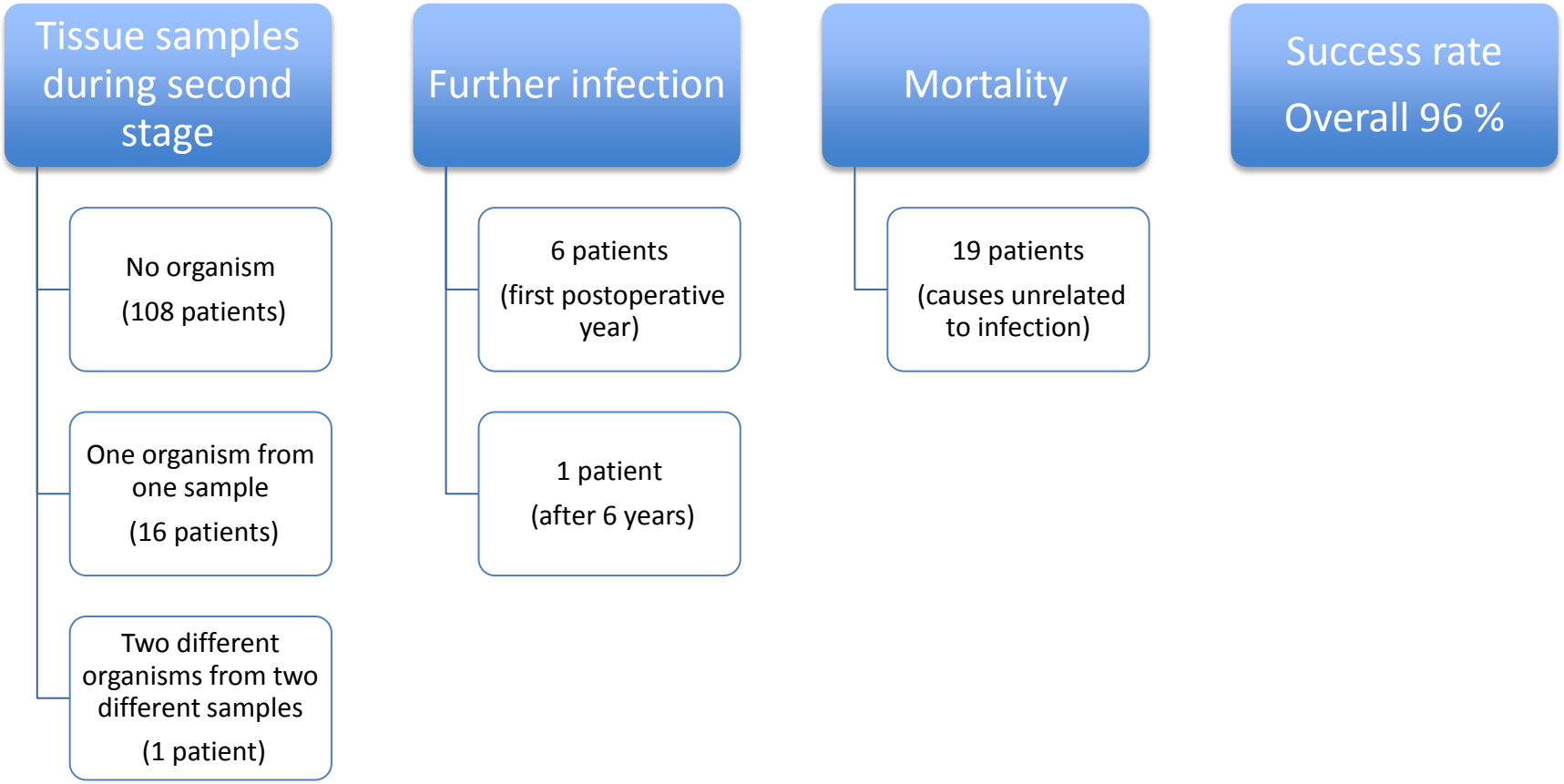
Clinical, radiological and serological assessment

Harris Hip Score for functional outcome

Results:


No of revisions
First revision (51.2%)
One prior revision (32%)
Two prior revisions (16.8%)
Micro organism
Identified preoperatively (81%)
Identified postoperatively (9%)
No organism isolated (10%)
Antibiotic loaded cement spacers
Dynamic spacers (92.5%)
Static spacers (7.5%)
HHS
Mean preop 38 (6 to 78.5)
Mean postop 81.2 (33 to 98)

Results:


Tissue samples during second stage
No organism (108 patients)
One organism from one sample (16 patients)
Two different organisms from two different samples (1 patient)
Further infection
6 patients (first postoperative year)
1 patient (after 6 years)
Mortality
19 patients (causes unrelated to infection)
Success rate
Overall 96 %

Results:

Micro-organism	Before 2004	After 2004	p-value
Staphylococcus aureus	20	9	
Methicillin-resistant staphylococcus aureus	6	14	
Coagulase-negative staphylococcus	6	15	0.004
Methicillin-resistant staph. epidermidis	4	10	
Polymicrobial	4	12	0.038
Streptococcus	6	5	
No growth	8	5	
Gram-negative bacteria	5	14	0.031
Anaerobic	3	5	
Fungal	1	1	
Mycobacterial	0	0	

Complications:

Dislocation	3
Periprosthetic #	1
Aseptic Loosening	2

Discussion:

Excellent results at five years 96% survivorship

Changing trend of isolated micro-organisms with more poly microbial infections

Cohort of complex tertiary cases

Literature:

Control of infection for two-stage revision arthroplasty of the hip:

Study	Number of patients	Follow-up	Rate of control of infection (%)	Harris hip score (mean, range)
Haddad et al 2000[7]	50	5.8 years	92	78 (54 to 92)
Koo et al 2001[8]	22	44 months	95	Not reported
Berend et al 2013[12]	186	53	83	Not reported
Wilson and Dorr 1989[23]	13	> 3 years	91	75 (range not reported)
Nestor et al 1994[24]	34	47 months	82	Not reported
Fehring, Calton and Griffin 1999[25]	25	41 months	92	81 (30 to 100)
Hoffman et al 2005[26]	27	76 months	94	53 (36 to 68)
Kraay et al 2005[27]	33	> 2 years	92	Not reported
Masri et al 2007[28]	29	> 2 years	90	70 (42 to 100)
Fink et al 2009[29]	36	35 months	100	90 (60 to 100)
Leung et al 2011[30]	38	58 months	79 (MRSA & MRSE)	Not reported

Mortality:

Higher as opposed to single stage --- potential disadvantage

15.2% in our study

7% prior to second stage:
**Berend et al : Two-stage treatment of hip periprosthetic joint infection is associated with a high rate of infection control but high mortality. CORR 2013;471:510–518

Limitations:

Small sample size

Single surgeon experience

19 patients died --- unable to know the risk of recurrent infection

Role for two-stage:

Host

Micro-organisms

- Resistant
- Anaerobic
- Fungal
- Mycobacterial
- Polymicrobial

Bone Loss

THANK YOU

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Is there a Role for Partial Revision Hip Replacement in Infection?

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Fares S Haddad

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Institute of Sport, Exercise & Health
University College London
November 2015

Introduction

- Infection remains a devastating complication for total hip replacements

- Advances have been made in treatment:
  - Two-stage revisions
  - Single stage revisions
  - Debridement, Antiobiotics with removal of liners + Implant Retention (DAIR)

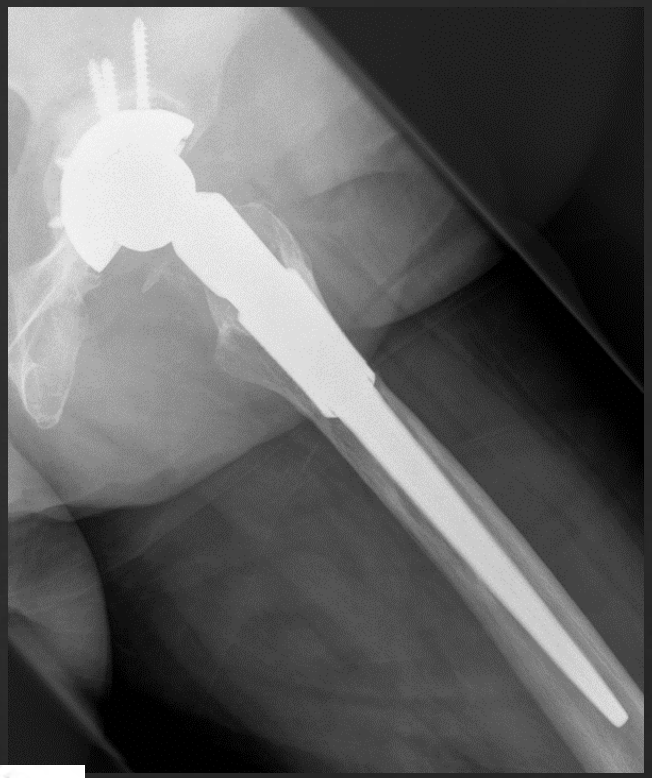
The Issue

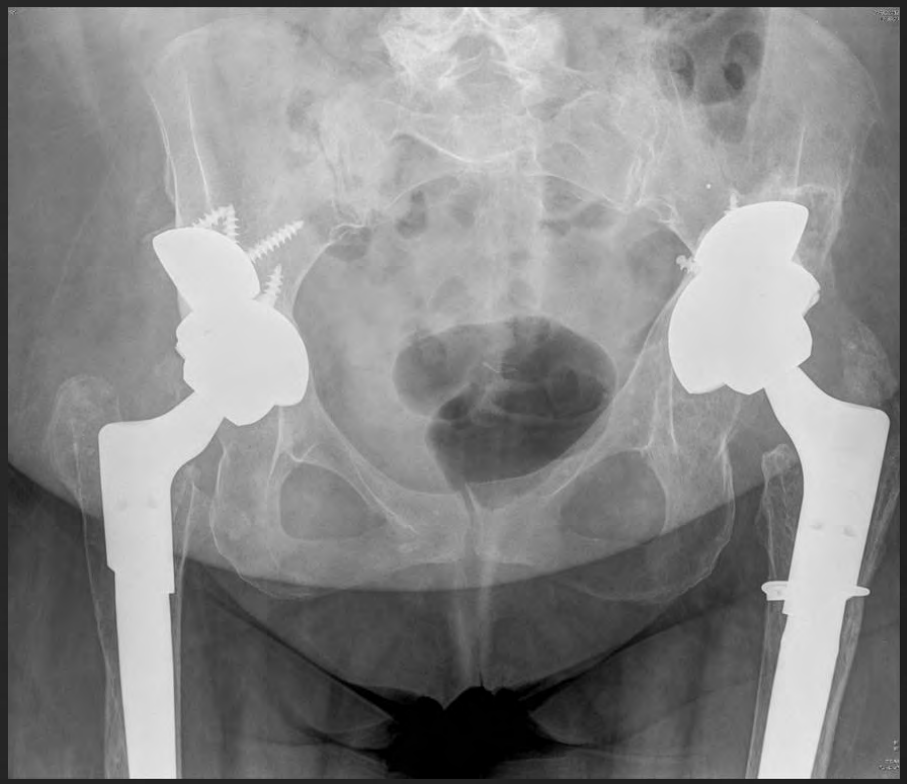
- Multiple revised cases and failed attempts to eradicate infection remain a big challenge
  - Delayed referrals after repeated treatment attempts locally
  - Increased complexity as a result of previous surgery
- Genuine risk of turning a difficult situation into an impossible one
- Selective Single Stage Revision Algorithm showed promising results

Bone Joint J 2014; 96-B:1312-18

The Issue

- Well Fixed Implants are a challenge





Materials and Methods

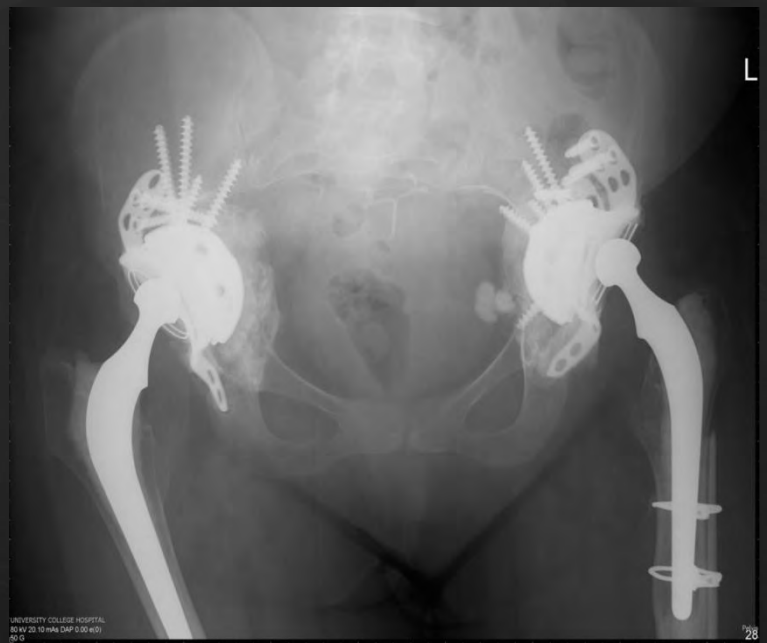
- Prospective data collection
- Partial DAIR and partial revision – single stage
- 18 patients with infected revision THA from January 2000 to December 2010:
  - 12 patients had retention of femoral reconstruction
  - 6 patients had retention of complex acetabular revision
- Decision made purely on the basis of component fixation and the reconstructive challenge

Materials and Methods

- Technique for Partial Revision Total Hip Replacement:
  - Single stage partial revision
  - Removal of loose / fibrous component
  - Aggressive thorough debridement, synovectomy and extensive lavage
  - Ingrown component, be it femoral or acetabular, was thoroughly cleaned, lavaged and scrubbed.
  - Re-draping was carried out and new instruments were used to re-implant the other side
  - Local antibiotics

Materials and Methods

- Intravenous antibiotics for a minimum of 5 days
- Oral antibiotics for a minimum of 6 weeks based on serology, wound-healing, and nutritional markers
- Ongoing treatment and f-up by MDT

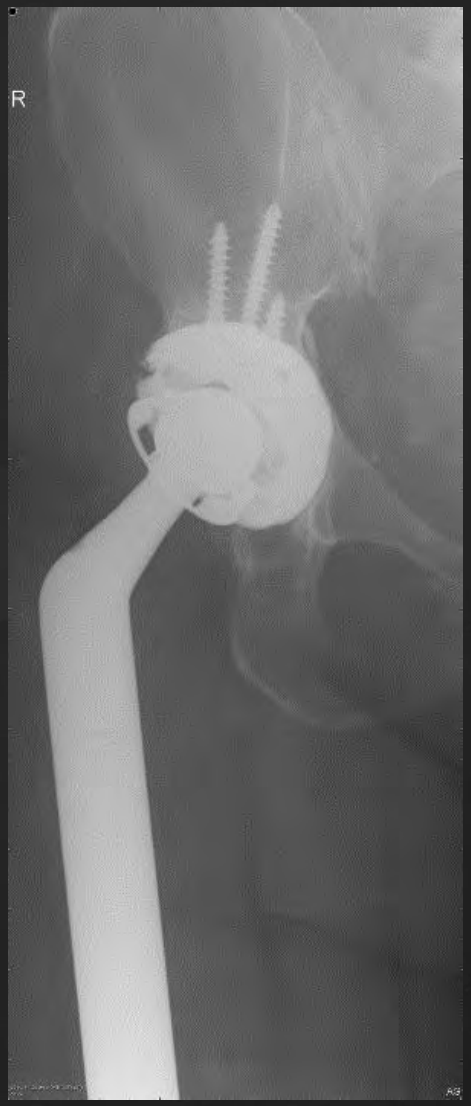


Follow Up

- Minimum follow up was 2 years (median, 5.1 years; range, 2–10 years)
- None of the 18 patients in this series were lost to follow up
  4 died – 3 of which were infection free
- Failure was defined as recurrence of infection or need for long-term suppressive antibiotics

Results

- Organisms
  - 3 MRSA
  - 4 MSSA
  - 4 CNS
  - 3 Pseudomonas
  - 2 Steptococcal
  - 2 Enterobacter



Results

- Three patients (16.7%)
  - 2 with partial acetabular component exchange
  - 1 with partial femoral component exchange failed
  - secondary to recurrence of infection at 3, 9 and 10 months; all were treated by two-stage revision (successful in 2)
- No re-infection was seen in the other cases
- Median Harris hip score was 78 (range, 46–89)

Discussion

- Two Stage with Femoral Cement Mantle Retention
- Morley et al. retained well fixed cement mantle in 15 patients with infected THA treated with 2 stage revision and with a minimum 5 year follow up
- One patient had recurrence of infection

J Bone Joint Surg Br. 2012 Mar;94(3):322-7

Discussion

- Partial Two Stage Revision

- Lombardi et al., performed partial 2 stage revision THR in 19 patients with infected THR and well fixed femoral components and mean of 4 years follow up (2-11)

- This involved:
  - complete acetabular component removal
  - aggressive soft tissue débridement
  - retention of the well-fixed femoral stem
  - placement of an antibiotic-cement femoral head
  - postoperative course of antibiotics
  - delayed reimplantation

- Two patients had recurrent infection after 3 years

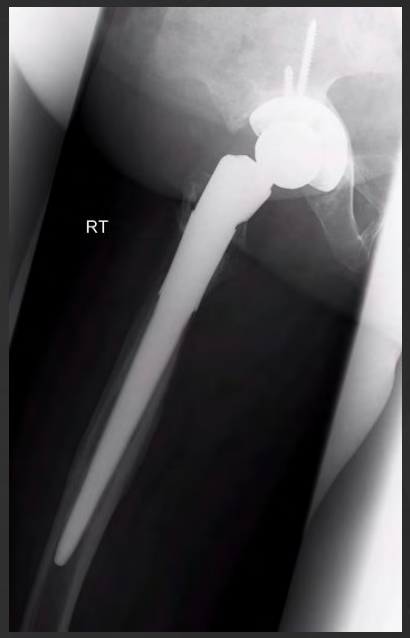
Clin Orthop Relat Res. 2014 Feb; 472(2): 437–448

Conclusion

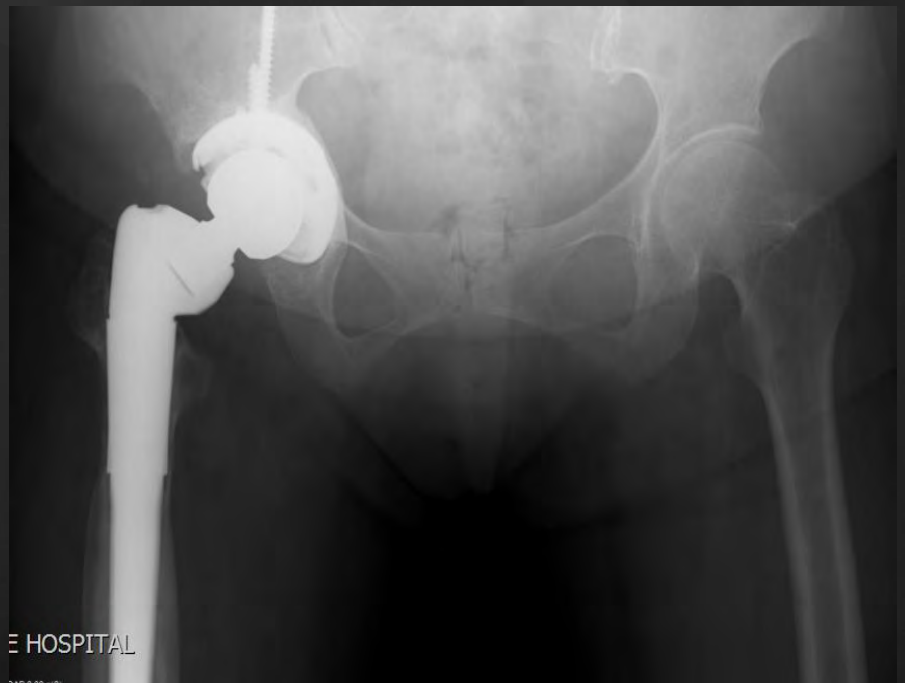
- Partial Single Stage Revision for Infection is **NOT** standard of care.
- Interfaces must be completely intact
- May just be delaying the inevitable
  - More data needed

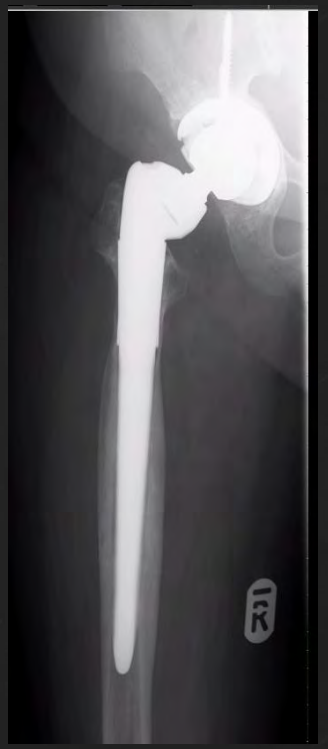
Conclusion

- The potential for bone damage and compromised function is a major consideration in revision arthroplasty for infection
- This technique should only be considered if the implant is well fixed / ingrown, and appropriate surgical expertise and antibiotics are available
- Short term results are surprisingly reassuring
- Long term results are needed before wider adoption



Thank You





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Acetabular reconstruction using tantalum augments and impaction graft in single stage revision for periprosthetic infection

Combined Meeting of the BHS and SIDA 2015

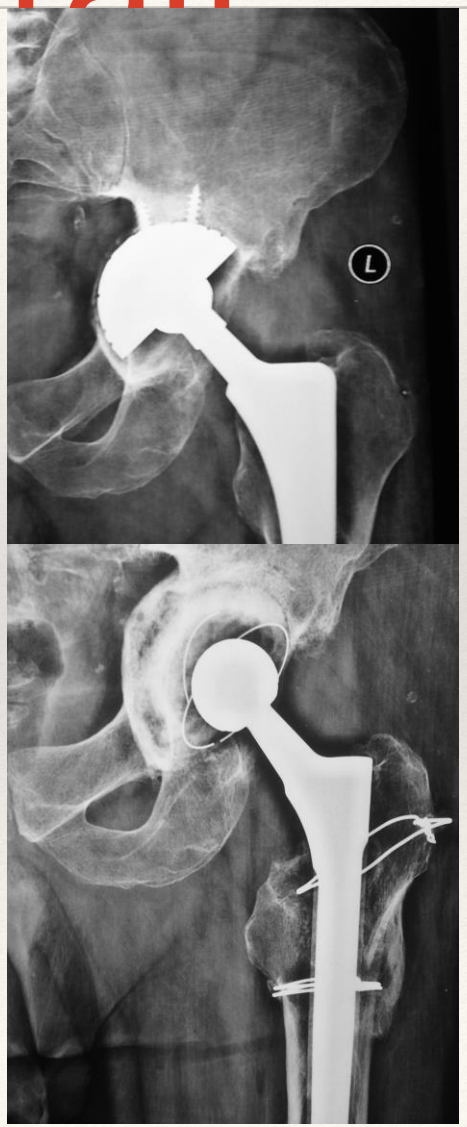
Ayman Ebied
MCh, PhD, FRCS (Tr & Orth)
Ahmed A Ebied MS
Menoufia University, Egypt

Disclosure

- None related to the subject of this study

Long term results of impaction graft

- Autogenous bone graft
- Primary THR
- Cavitary and segmental defects
- 94% survival at an average 12.3 years



Marianne L. M. Welten, MD, B. Willem Schreurs, MD, PhD, Pieter Buma, PhD, Nico Verdonschot, PhD, and Tom J. J. H. Slooff, MD, PhD (Acetabular Reconstruction With Impacted Morcellized Cancellous Bone Autograft and Cemented Primary Total Hip Arthroplasty : A 10- to 17-Year Follow-up

The rational of using TM augments and impaction graft

- Near anatomic insertion of the cup
- TM augments can overcome peripheral segmental bone loss giving good chance for impaction of the bone graft
- Providing primary stability to the cemented cup

Borland WS, Bhattacharya R, Holland JP, et al. Use of porous trabecular metal augments with impaction bone grafting in management of acetabular bone loss. Early to medium-term results. Acta Orthop 2012;83:347.

Gill K, Wilson MJ, Whitehouse SL, et al. Results using Trabecular MetalTM augments n combination with acetabular impaction bone grafting in deficient acetabula. Hip Int 2013;23:522.

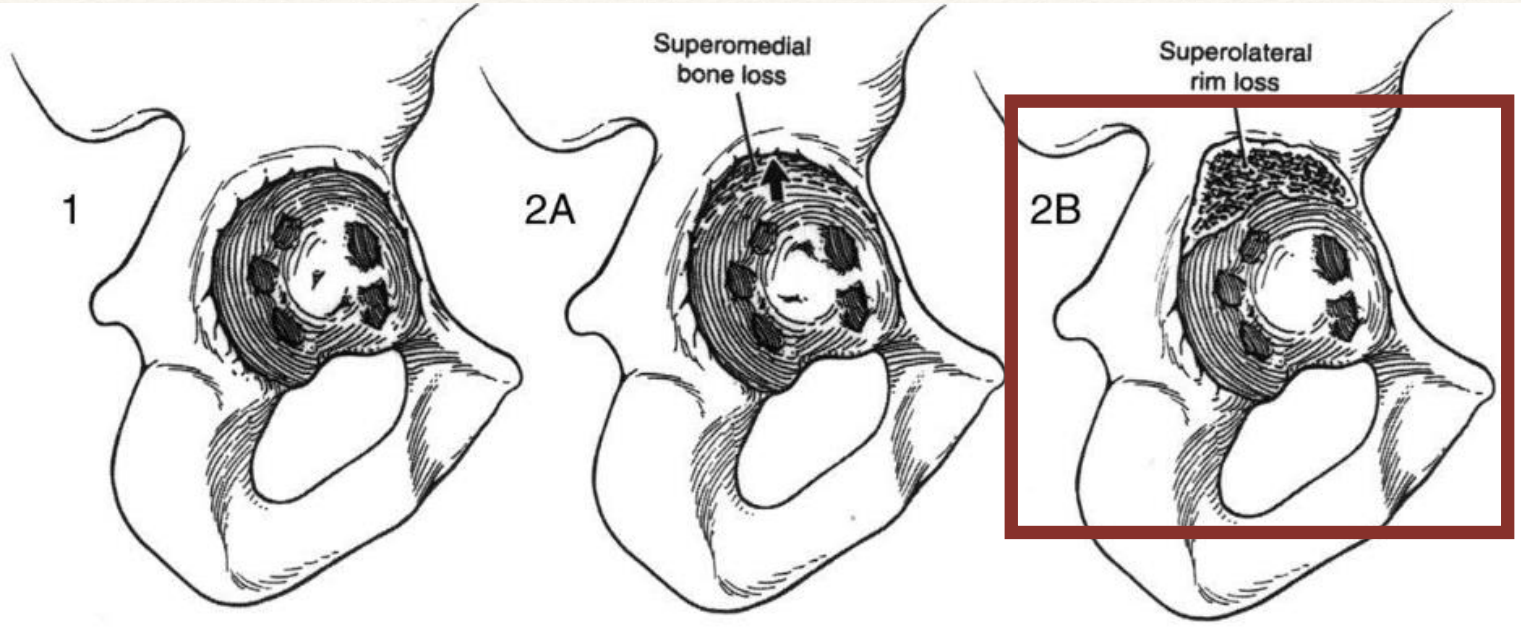
Aim of this study

- Results of antibiotic loaded impaction graft and augments in a protocol for single stage revision

Material and methods

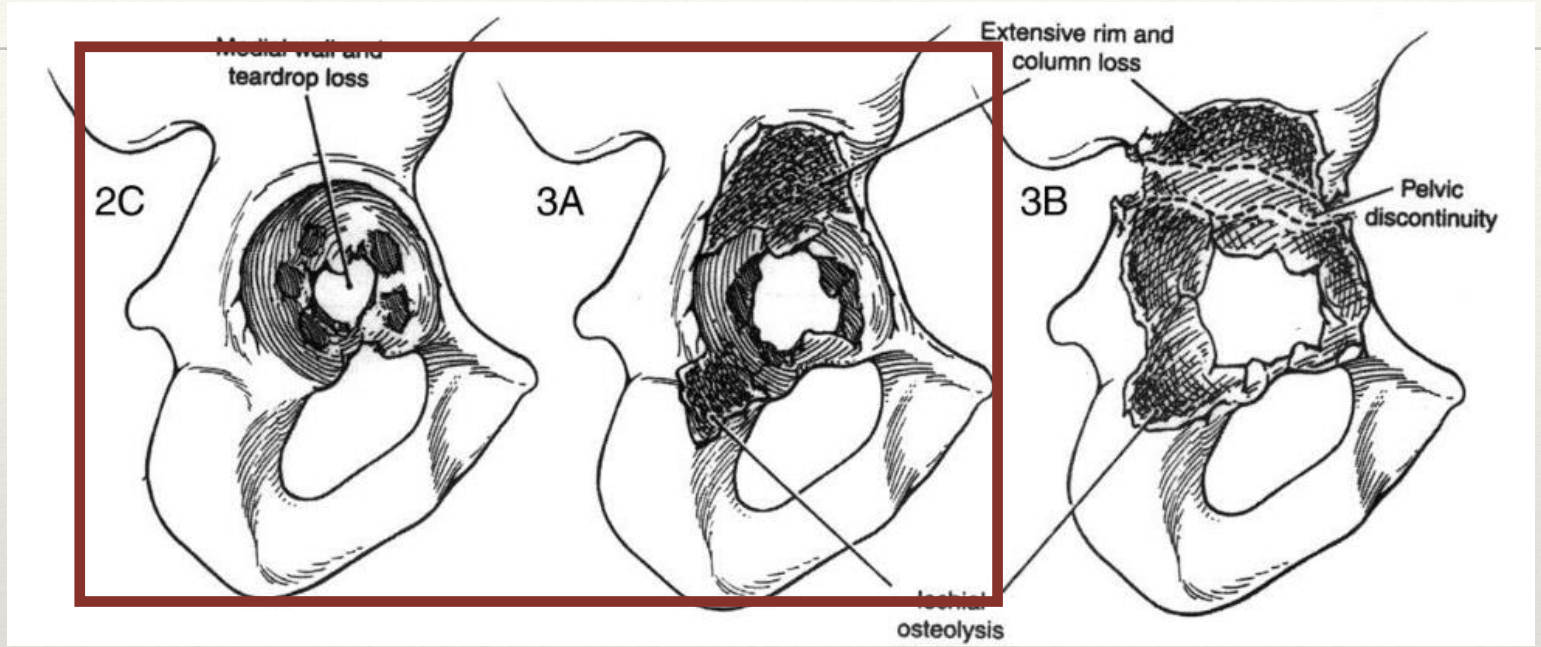
- Inclusion criteria
  - No active draining sinus
  - Chronic infection (No acute septicemia)
  - Identification of the infecting organism by preoperative aspiration
  - Acetabular defects are combined segmental and cavitary (AAOS) or (IIB, IIC, IIIA Paproskey's classification)
  - Viable soft tissue envelope after debridement

Paprosky classification



2A	Oval enlargement, superior rim intact, <2cm migration superiorly	Distorted oval enlargement superiorly	Intact, supportive	<50% cancellous, sclerotic bone frequent
2B	Oval enlargement, superior rim lysis, <2cm migration superolaterally	Distorted oval enlargement superiorly	Intact, supportive	<50% cancellous, sclerotic bone frequent
2C	Oval enlargement	Distorted oval enlargement, medial wall lysis	Intact, supportive	<50% cancellous, sclerotic bone frequent

Paproskey classification

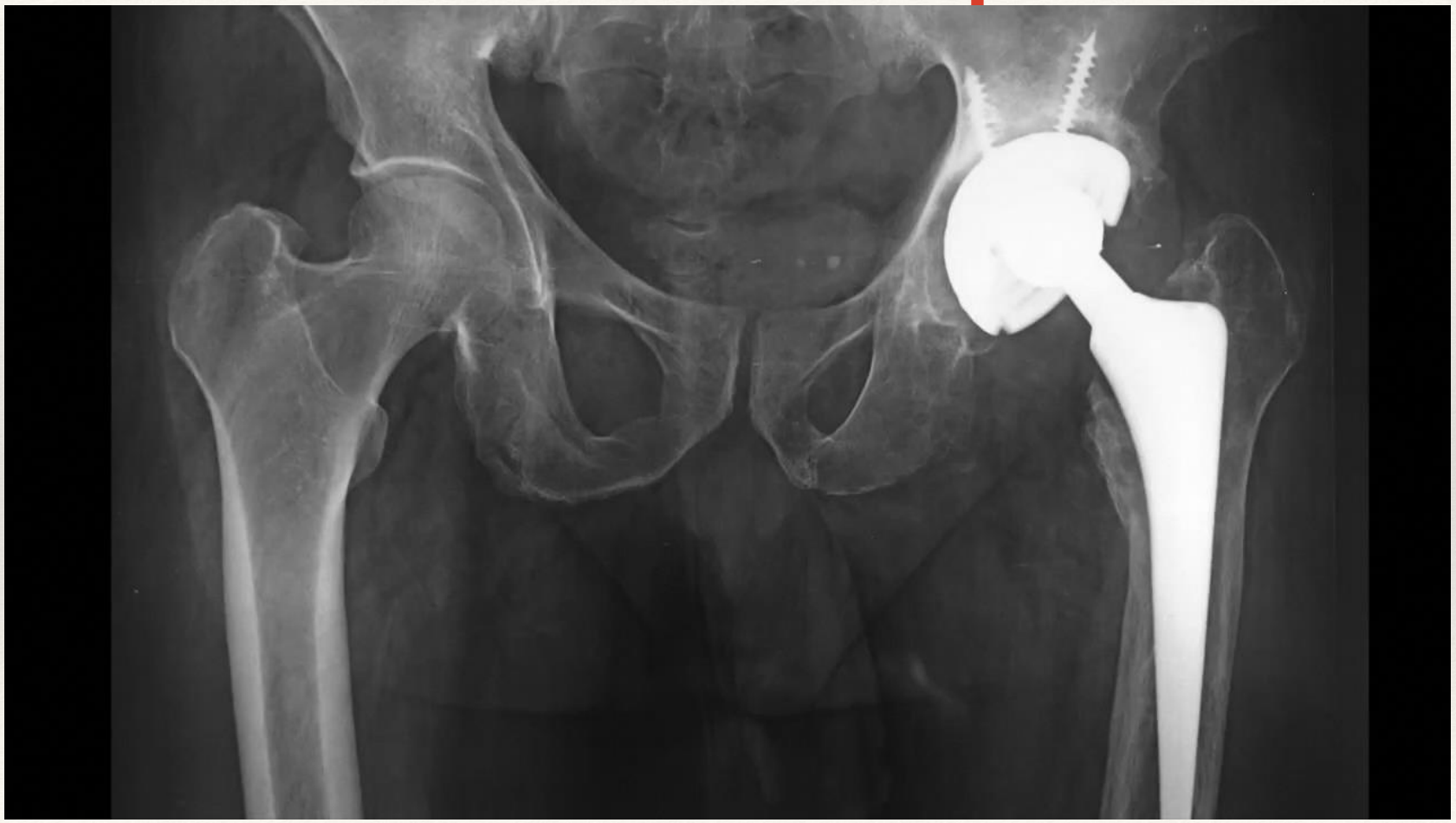


3A	Missing bone in the 10AM-2PM positions, >2cm superior migration, ± teardrop lysis	Severly compromised	Non supportive	Membranous, sclerotic
3B	Missing bone in the 9AM-5PM positions, >2cm superior or medial migration, teardrop lysis	Severly compromised	Non supportive	Membranous, sclerotic

Material and methods

- Posterior approach +/- sliding trochanteric osteotomy
- All patients had Impaction graft using fresh frozen femoral heads
- Tantalum augments (TM augments , Zimmer) were used
- Cemented HXL poly cups (32 mm or 28 mm)
- Long straight Wagner stems (Zimmer)

Material and methods: the technique



Material and methods

- Antibiotic (AB) protocol
  - Four grams of antibiotic powder were added per femoral head (usually combination)
  - Antibiotics (IV and/or oral) were commenced on the day of surgery and continued for 8-12 weeks postoperative

Material and methods

- Patients' risk factors and host type were evaluated according to McPherson's categories
- HHS was recorded preoperative then at 6, 12 months and annually afterwards
- Radiological evaluation for:
  - Restoration of anatomic centre of rotation
  - Graft & augment incorporation
  - Cup and stem stability

Results

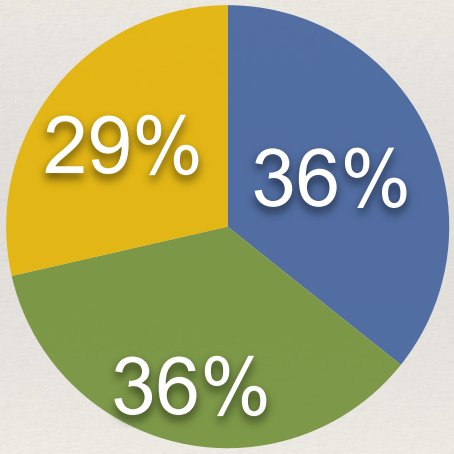
- Forty seven single stage revisions between July 2008 and August 2012 were prospectively evaluated
- Fourteen had combined metal augments and AB loaded impaction graft with average age 54 years (range 39-65)
- All 14 were clear of infection at an average f/u 4 years (range 2-6 years)

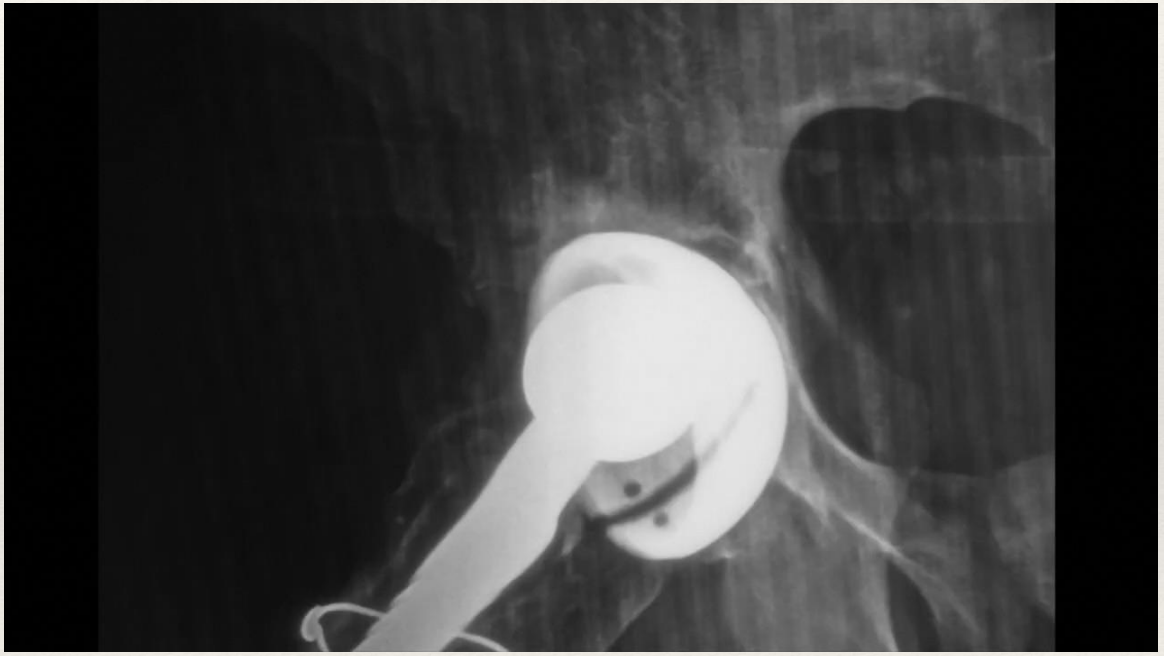
Results

- Significant improvement of the HHS from 28 pre to 87 post ($P < 0.001$)
- All cases had stable cups and augments
- Graft incorporation was observed in all patients

Results

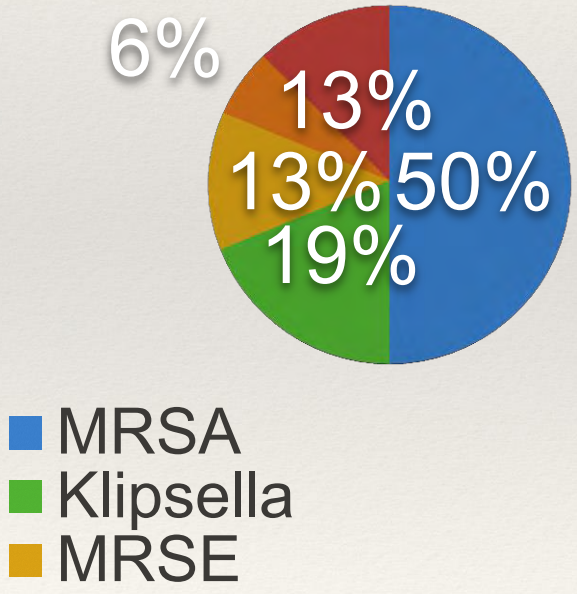
Acetabular defects according to Paprosky classification



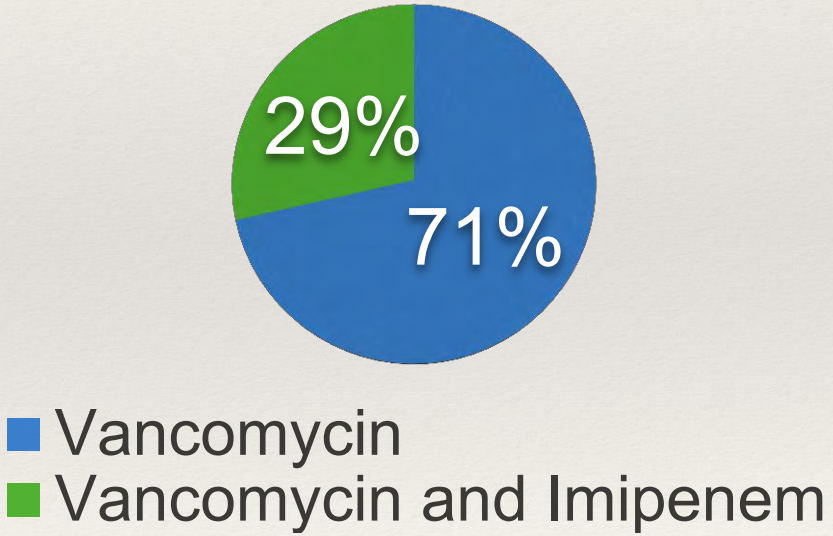


Results

Organisms identified by aspiration and tissue cultures

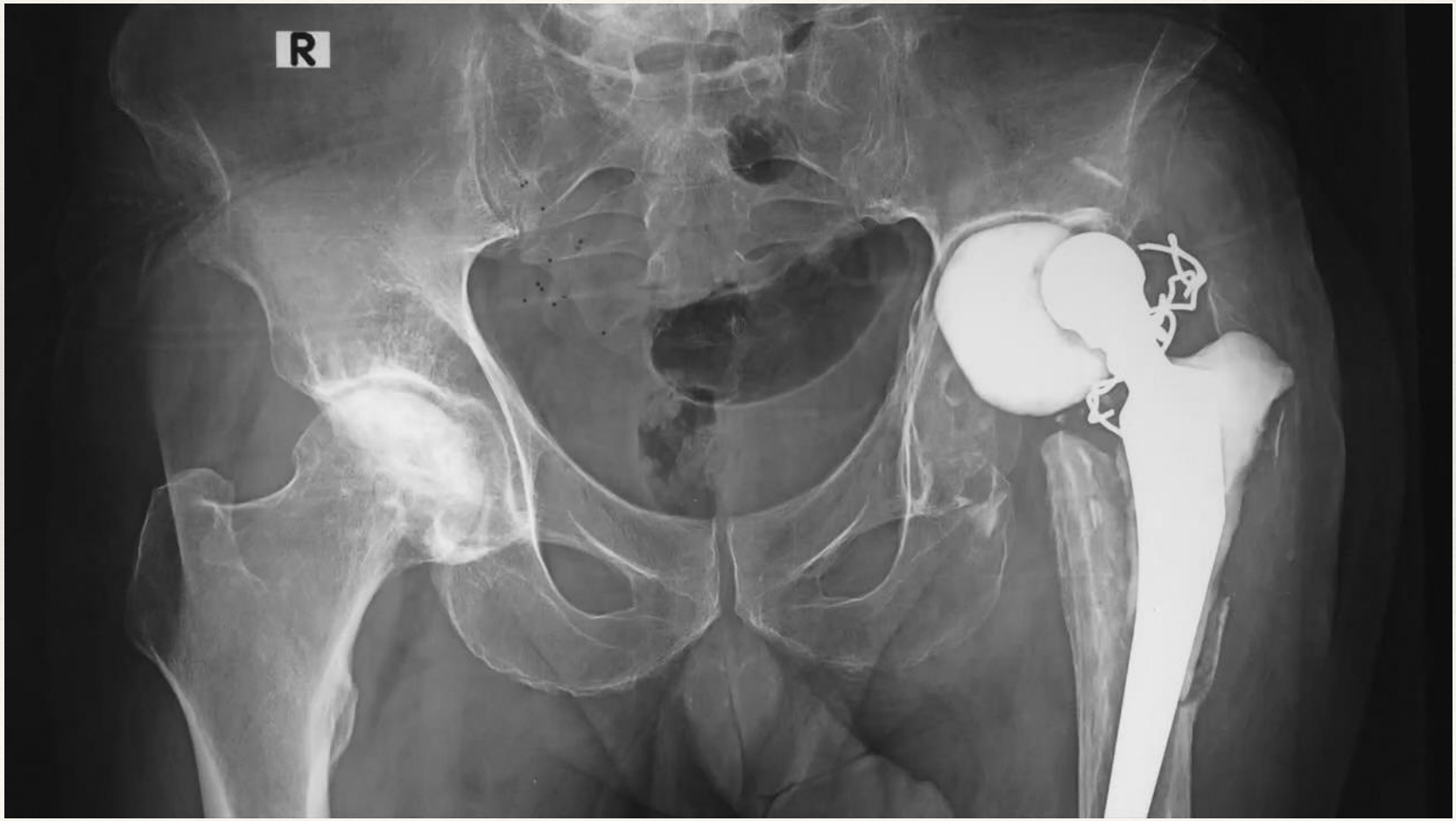


Antibiotics added to the allograft



Results - restoring hip centre of rotation

- Only 2 patients had higher hip centre < 1 cm



Complications

- One patient had deterioration of renal function that needed hospital admission 4 weeks post surgery
- One patient died by cardiac arrest 4 years following the index procedure

Discussion

- These results are similar to previous reports in revision for aseptic loosening
- AB loaded graft may have helped in delivering high doses of AB
- Augments reduce the amount of bone graft needed and possibly convert an uncontained defect to a contained one
- Small series and needs a longer follow up

Conclusion

- Results are encouraging to continue using this technique in a larger cohort
- Many patients with periprosthetic infection can benefit from single stage revision. Do we need a better system for categorization?

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
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26-27 NOVEMBER 2015

MILAN, ITALY

Wrightington, Wigan and Leigh NHS
NHS Foundation Trust

Revision Total Hip Arthroplasty: Diagnosing infection, Is aspiration useful?

Mr A Turaev
Mr A. Radhakrishnan
Mr A. Hassanein
Mr Nagai
Prof P. Kay

your hospitals, your health, our priority

wrightington
Lower Limb Unit

The John Charnley Trust

Background

- 89,945 Total Hip Procedures
- 80,194 hips in 2013
- 79,719 hips in 2012
- 0.6% increase
- 33% were cemented THRs
- 42% were cementless
- 1% were hip resurfacing procedures
- <1% were large head metal-on-metal (LHMoM) THRs.

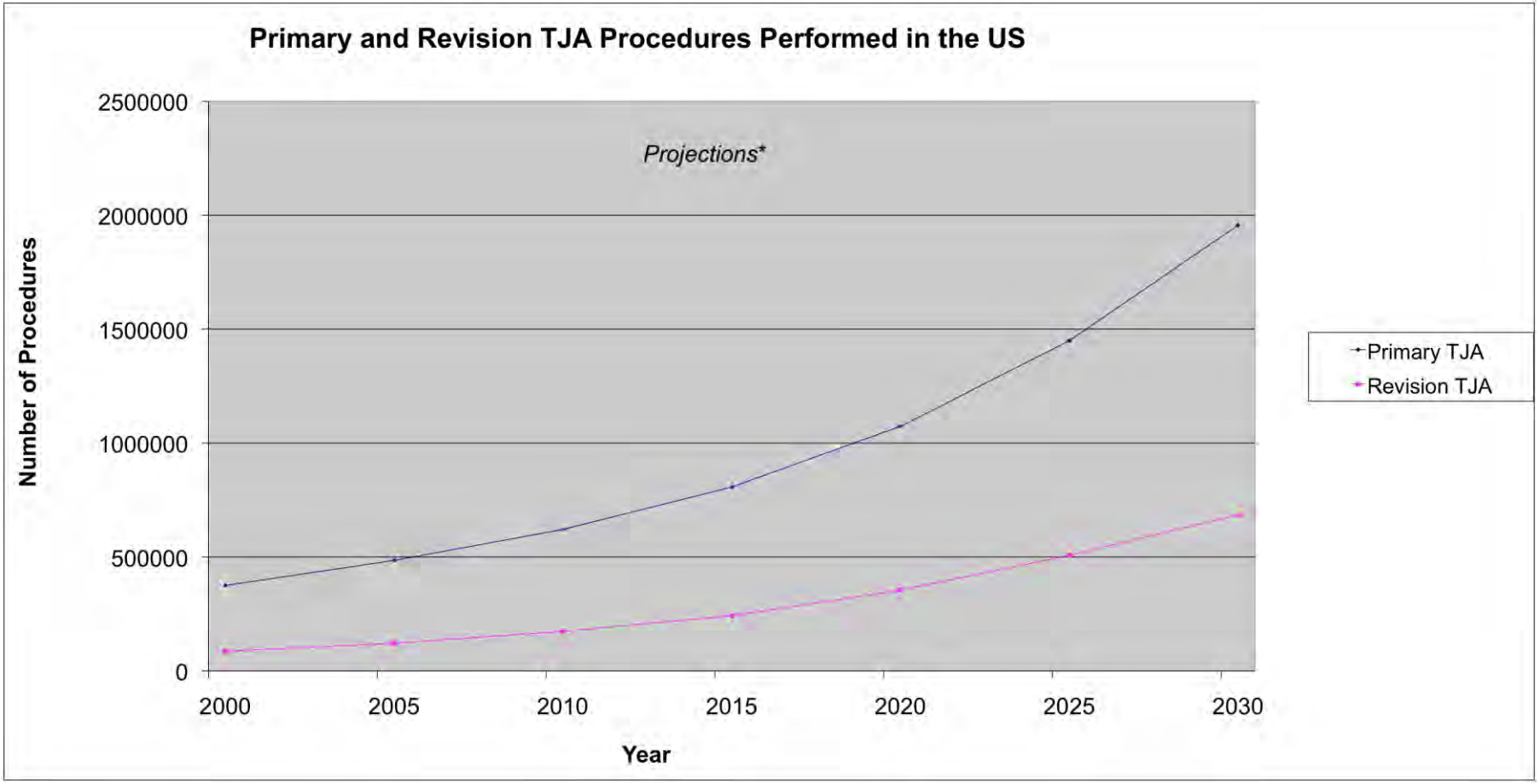
your hospitals, your health, our priority

Background

- 9,751 hip revision procedures were reported in 2013
- A decrease of 289 compared with 2012
- 8,489 (87%)- single-stage revision procedures
- 573 (6%)- stage one of a two-stage process
- 621 (6%) procedures were stage two of a two-stage revision
- 68 (<1%)- excision arthroplasty procedures.

(NJR 2014)

TJA Volume Estimates



Introduction

- The aim of this retrospective study is to review diagnosis, management and outcomes of the revision THA at Wrightington Hospital in 2014
- Causes for revision hip surgery
- Complications of revision hip surgery
- Clinical outcomes of revision hip surgery
- Mortality at 30 days, 3months and 6 months

Causes for revision THA

A.	Metal on Metal (adverse soft tissue reaction)	14%
B.	Dislocation/Subluxation	13%
C.	Infection	13%
D.	Peri-prosthetic fracture	10%
E.	Aseptic loosening	38%
F.	Implant wear(acetabular)	11%
G.	Fractured stem	2%
H.	Pain	22%

(NJR 2014)

Diagnosis

- A good clinical history and examination
- Imaging (X-rays, USS, Bone scan, CT and MRI & Arthrography)
- Nuclear Medicine
- Biochemistry (CRP, ESR, Co, Chromium)
- Tissue biopsy (culture)
- MRI MARS scan
- MHRA guidelines (metal ion levels)
- Regular follow up

Diagnosis PJI

- Diagnosis of Periprosthetic Joint Infection (PJI) remains a true challenge to the orthopaedic community

- The MSIS definition of PJI consists of:
- One major or
- Four or more minor criteria

www.aaos.org/news/aaosnow/nov11/clinical1.asp

Selection of Patients for Hip Aspiration

Probability of Infection	ESR and CRP Results	Planned Reoperation Status	Recommended Test
Higher	+ + or + −	Planned or not planned	Aspiration
Lower	+ + or + −	Planned	Aspiration or Frozen Section
Lower	+ +	Not planned	Aspiration
Lower	+ −	Not planned	Please see Recommendation 6
Higher or Lower	− −	Planned or not planned	No further testing

www.aaos.org/research/guidelines/PJIsummary.pdf

Materials and Methods

- This is a retrospective review study of 286 patients who underwent revision hip arthroplasty in 2014 at Wrightington Hospital

- The electronic hospital system (Picture Archiving and Communication System, PACS) and Electronic Patient Record (EPR) systems were used for data collection.

Materials and Methods

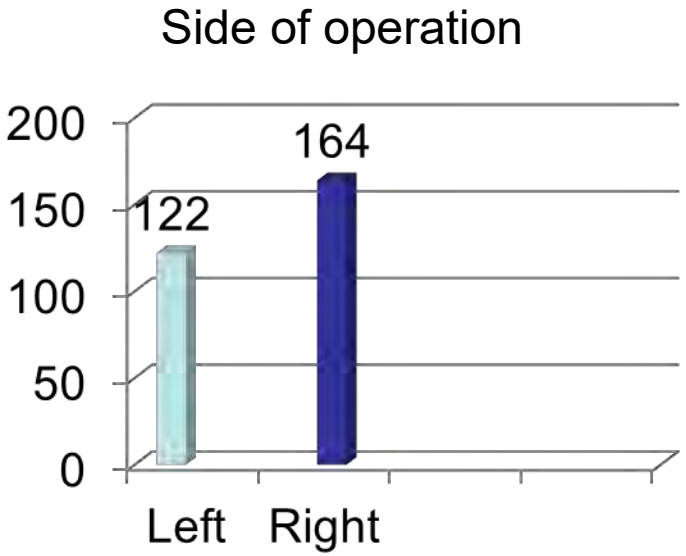
The selection criteria hip aspiration were defined as presence of 1 or more of the following features:

1. Clinical or radiological suspicion of infection
2. Erythrocyte sedimentation rate(ESR) higher than >30, C-reactive protein(CRP) level higher than >10
3. Presence of any disorder that can raise inflammatory markers, thus making them unreliable suspicion of infection
4. History of wound infection or problems
5. Implant failure less than 5 years after arthroplasty
6. If the patients were taking antibiotics, they were stopped at least 2 weeks before hip aspiration

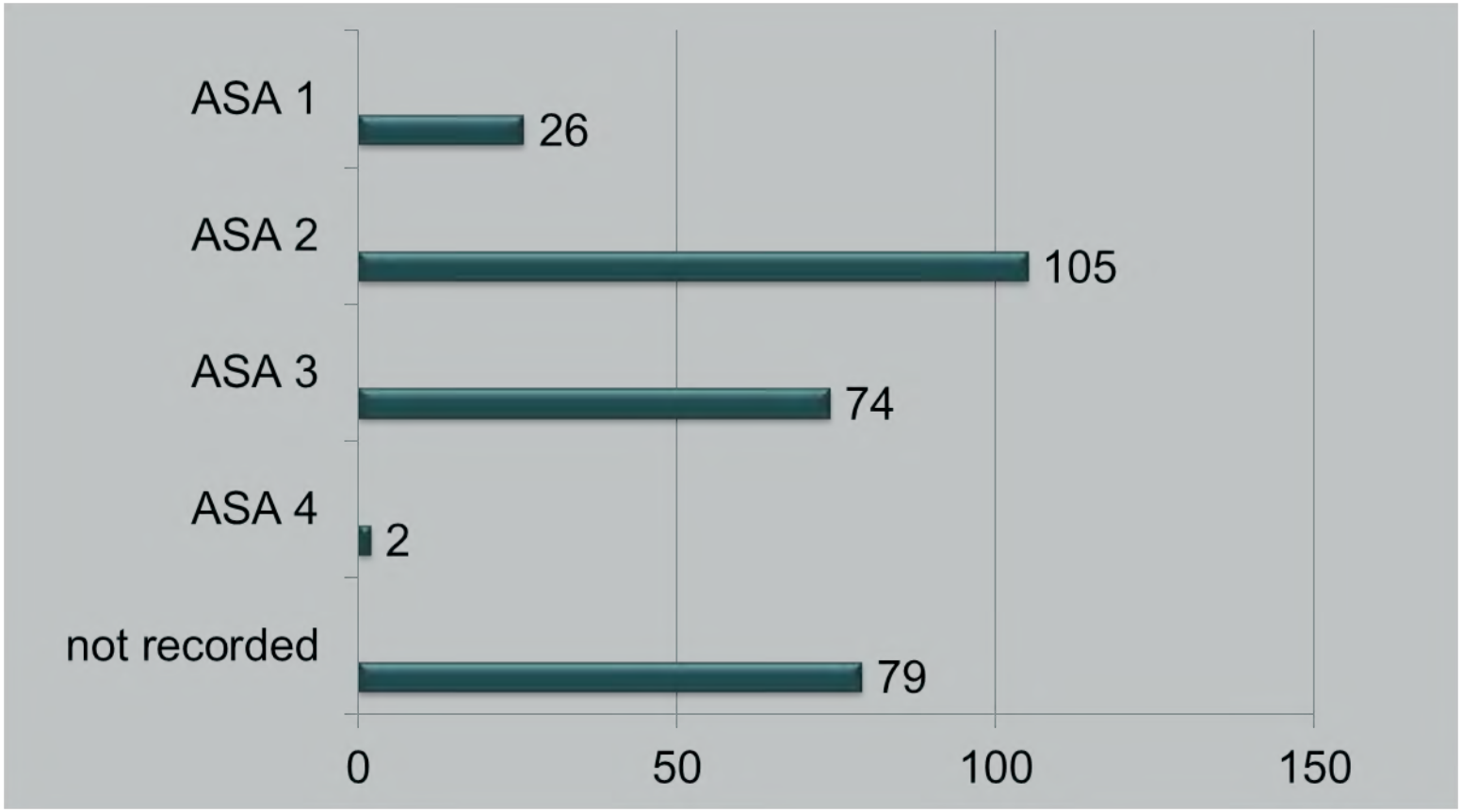
(Ali et al, 2006)

Results

- Number of patients 286
- Age: Average 67.91 (22-92)

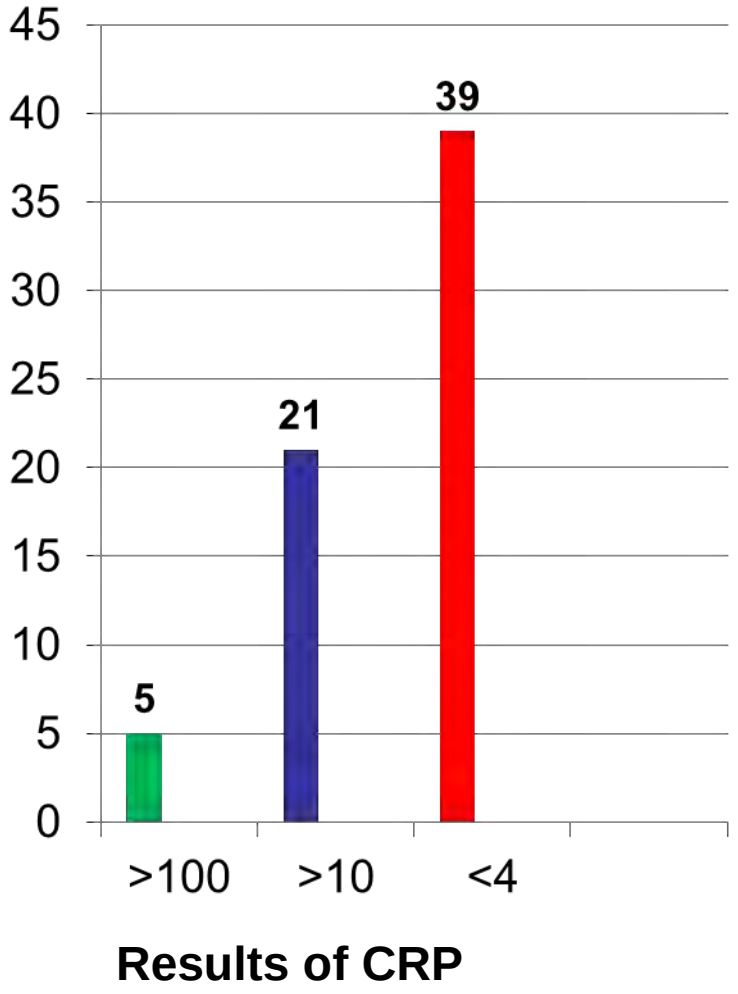


ASA Grade



Suspicion of infection

- ESR-60 patients
- >30(ESR)-12 patients
- 36 patients had history of wound infection following primary THA(?Deep infection)



Microbiology

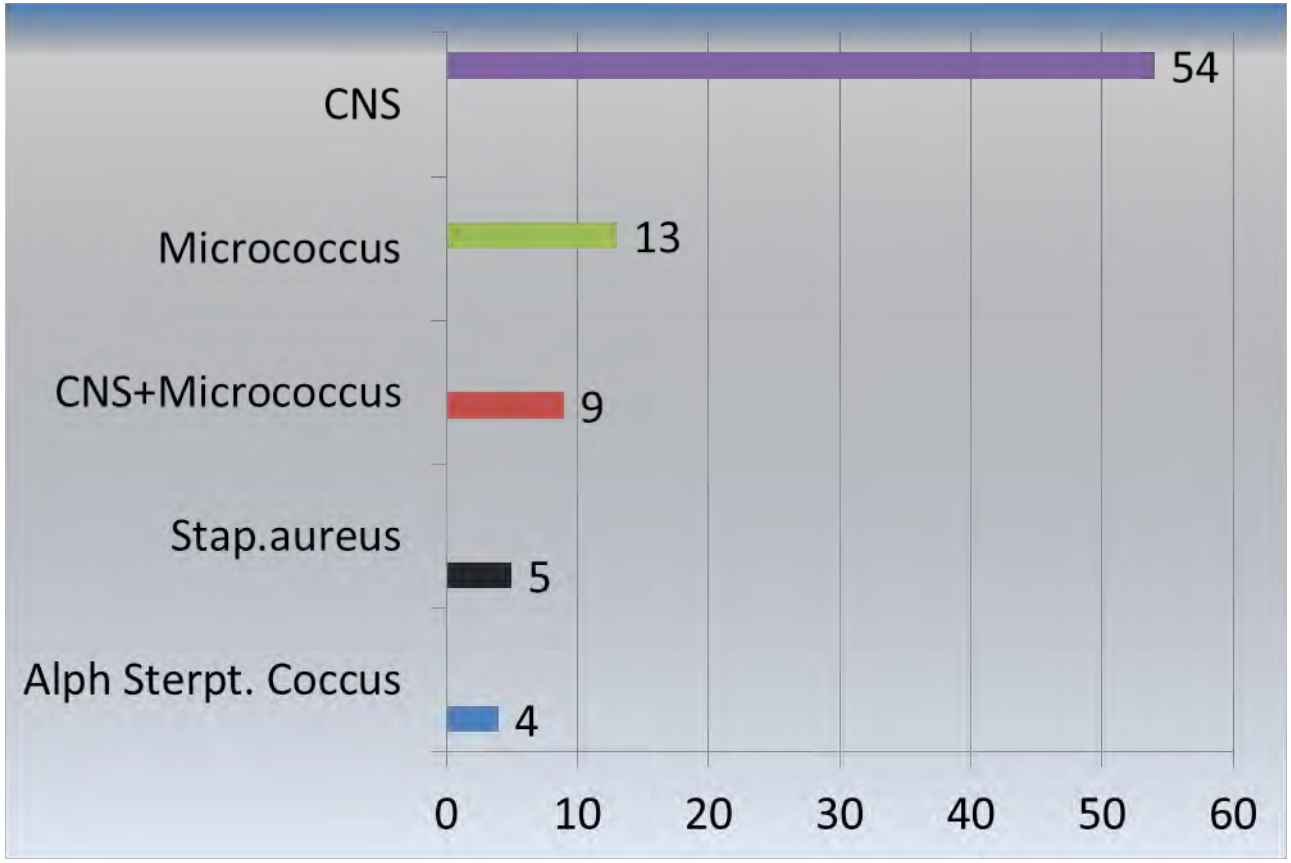
Hip Aspiration

- 48 patients had pre-op hip aspiration
- Dry tap-3 aspirate
- 3 Hip aspirates had positive culture
- Intraoperative culture positive in 126/286 patients
- Antibiotics given in 39 patients
- Duration of treatment from 7 days to 90 days

Culture results

- From 48 patients 3(6.25%) had positive aspirate and positive intraoperative culture
- 45 patients had negative aspirate culture
- 21/45(46.66%) had intraoperative positive culture
- 9/21patients treated with course of antibiotics
- 9/45(20%) had negative aspirate were treated post revision

Main bacterial causes of hip infection



Culture reports

- Aspirate negative patient who had intraoperative culture positive(False negative)

✓ 18/42(42.85%) patients

✓6/18 patients treated with Abx post op

Pre-operative aspiration for PJI Sensitivity, Specificity and PPV/NPV

Sensitivity	**12.5%**
Specificity	**24/24=100%**
Positive predictive value	**100%**
Negative predictive value	**53.3%**

Discussion

- Negative predictive value of hip aspiration is poor in our findings
- Positive predictive value of positive hip aspirate in our series were 100%
- There was no unified institutional guidelines with regards to preoperative blood test, number of intraoperative samples taken and indication of hip aspiration

Discussion

- Diagnose of PJI can be challenging, as conventional methods are often not effective
- Recent studies on using synovial biomarkers—such as synovial α-defensin and synovial CRP—to diagnose PJI have shown encouraging results
- Extended culture results
- Encourage additional studies

Current research

- Measurement of CRP from synovial fluid
- Synovial leukocyte attester(a-Defencin)
- Sonication of explanted prosthetics
- Polymerase chain reaction(PCR)
- Interleukin-6

Thank you!

Grazie!

INTERNATIONAL COMBINED MEETING

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26-27 NOVEMBER 2015

MILAN, ITALY

Atipical THR infections management

Ana Façanha; Afonso Ruano; Luísa Fardilha; Raul Cerqueira; Susana Pinto; Carolina Afonso; Miguel Freitas

Chief of Orthopaedic Department: Afonso Ruano

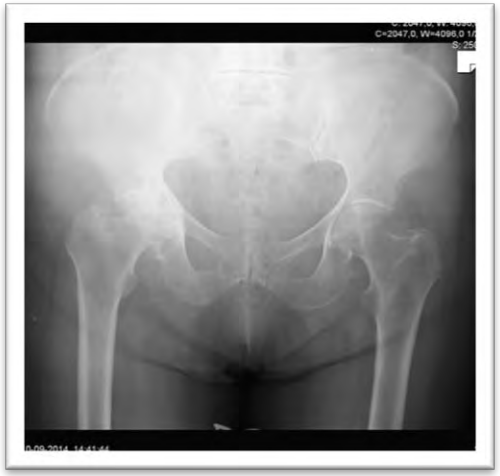
Introduction

- TJI is a dreadfull complication
  - Fungal TJI accounts for less than 1%[1]
  - +++ *Candida albicans*
- Lack of guidlines for managment of periprosthetic fungal infections[1,2,3]
- Comorbilities (DM, AR, immunodeficiencies...) instigate fungal infection and hinder the treatment [3,4,5]

1. C. Glabratta Prosthetic hip infection; F. Bartalsi et al; amjorthopedics, November 2012
2. Cement spacers in the treatment of periprosthetic fungal infections; Anagnostakos et al; The Journal of Arthroplasty Vol. 27 No. 2 February 2012
3. Fungal periprosthetic joint infection of the hio: a systematic review; B. Schoof et all; Orthopedic Review 2015; volume 7: 5748
4. Treatment of C. Albicans – infected Total Hip Prosthesis; Deelstra et al; The Journal of Arthroplasty Vol. 28 No. 2 2013
5. 2 – stage revision recommended for treatment of fungal hip and knee prosthetic joint infections; J. Kuiper et all; Acta Orthopaedica 2013, 84 (6): 517-523

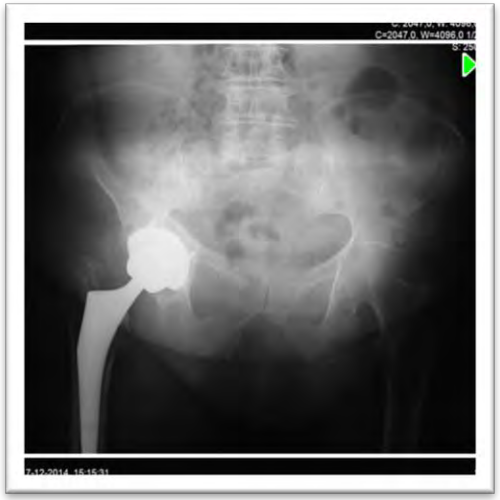
Case Report

- ♀ 79 years
- Healthy
- Nov 2014 → THR for hip arthrosis



Nov 2014

- Dec 2014 → ER
  - Pain
  - Serous drainage



Dec 2014

Case Report → 1M

- Surgical debridement and exchange of polyethilene
- Cultures → sterile
- Vancomicyn + Rifampicin (empirical)

Case Report → 2M

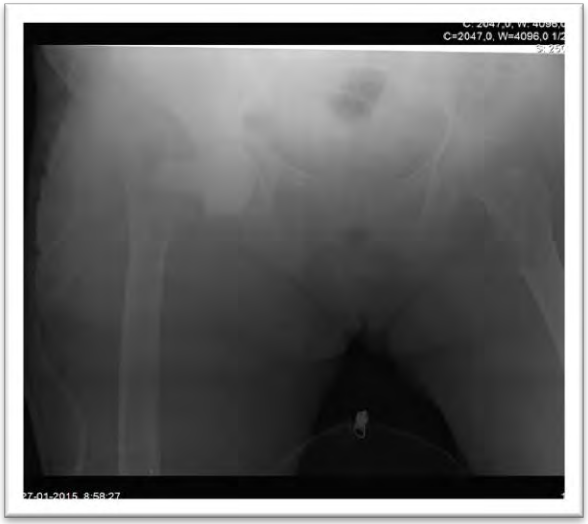
- Persistent complains and drainage
- Implant removal + cement spacer impregnated with gentamicin/vancomycin was placed

LÍQUIDO ARTICULAR-EXAME BACTERIOLÓGICO

EXAME CULTURAL

Candida albicans (canalb)

	canalb
Anfotericina B	S
Flucitosina	S
Fluconazol	S
Voriconazol	S
Caspofungina	S



Case Report

- Fluconazole (+ Vancomycin/ Co Trimoxazole – 12W)
  - Drainage stopped, wound closed
  - Inflammatory markers became negative
  - Leg pain improved
- Patient discharged, weight bearing as tolerated.
- 4M of antifungal treatment

Conclusions

- No consensus!

Treatment	Diagnosis
Duration → > 6W of oral therapy	Substantial delay
2-stage revision is generally recommended[3,5]	Cultured fungi should be considered pathogenic[6]
Antibiotic- loaded ciment (> risk of superimposed bacterial infection)[2,4] Antifungal is still controversial [3,6]	Obtaining multiple samples, prolonged culture, and special staining[3]

1. C. Glabratta Prosthetic hip infection; F. Bartalsi et al; amjorthopedics, November 2012
2. Fungal periprosthetic joint infection of the hio: a systematic review; B. Schoof et all; Orthopedic Review 2015; volume 7: 5748
3. Treatment of C. Albicans – infected Total Hip Prosthesis; Deelstra et al; The Journal of Arthroplasty Vol. 28 No. 2 2013
4. 2 – stage revision recommended for treatment of fungal hip and knee prosthetic joint infections; J. Kuiper et all; Acta Orthopaedica 2013, 84 (6): 517-523

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Two Stage Revision With Preformed Spacers in Infected Hip Arthroplasty

Fozzato S., Tanas D., Testa A., D'Angelo F., Cherubino P.

Orthopaedic and Trauma Institute - Dept. of Biotechnology and Life Sciences
University of Insubria - Varese

The problem

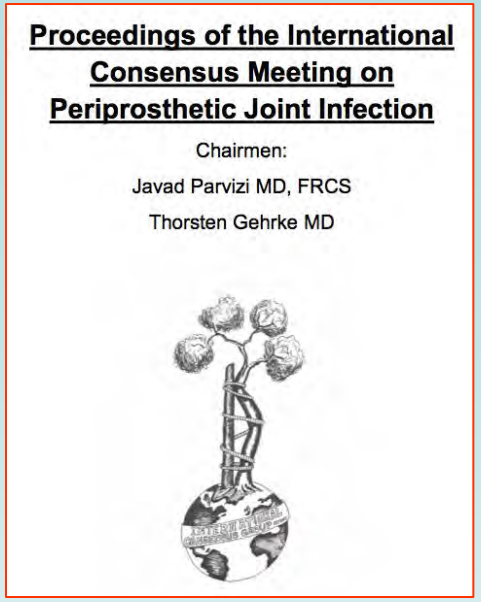
Periprosthetic joint infection (PJI) is one of the most destructive and costly complications of total hip replacement occurring in 0,3% - 1,7% of patients

Del Pozo JL, Patel R (2009) Infection associated with prosthetic joints. N Engl J Med 361;787–794

Diagnosis

Consensus: PJI is defined with:

- ✓ 2 positive periprosthetic cultures with identical microrganisms;
- ✓ A sinus tract
- ✓ 3 of the minor criteria:
  - *Elevated serum CRP & ESR*
  - *Elevated synovial fluid WBC count or change on leukocyte esterase test strip*
  - *Elevated synovial fluid PMN percentage*
  - *Positive histological analysis of periprosthetic tissue*
  - *A single positive culture*



Confidence 85%

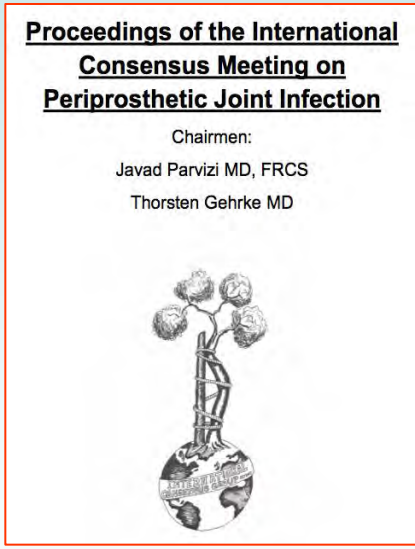
Therapeutic approaches

- *Antibiotics treatment*
- *Surgical debridement*
- *One stage revision*
- *Two stage revision*
- *Girdlestone resection*

Two stage revision: Indications

Consensus: Two-stage exchange when:

- Systemic manifestations (sepsis) are presented;
- Infection appears ovious but no organism has been identified;
- Preoperative cultures identifying difficult to treat and antibiotic-resistant organisms;
- Presence of a sinus tract,
- Inadequate and non-viable soft tissue coverage



Confidence 93%

Our experience

Dept. of ORTHOPAEDICS
Varese

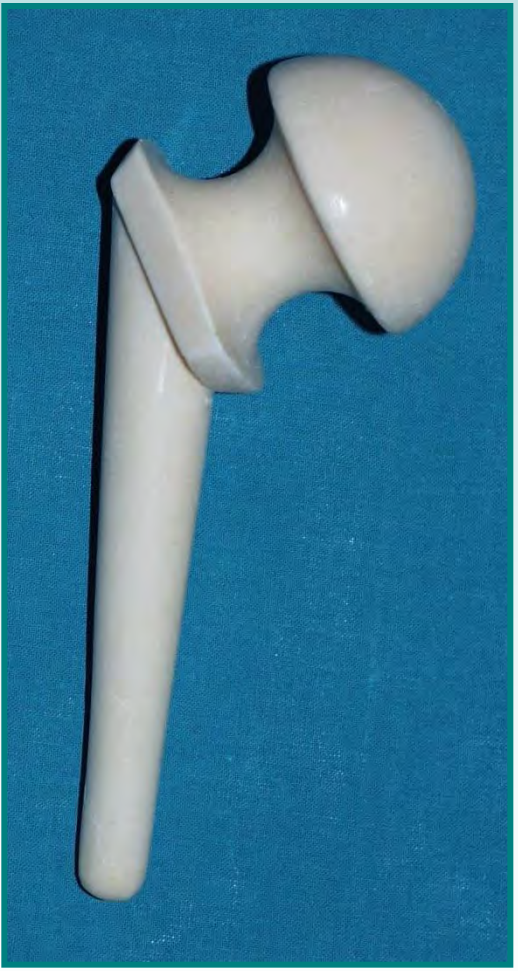
1999-2013

37 Two-Stages revision with *preformed spacer G*

20 men / 17 women

Mean age at 1st surgery 67.3 (39-85)

Spacer- G



- *Preformed Gentamicin loaded spacer*
- *Central load-bearing by cylindrical stainless still rod*
- *Optional fixation with antibiotic-loaded cement to enhance rotational stability*

(Gentamicin – Vancomicin)

Stem Standard VS Long

Head size: 46, 54, 60 mm

Spacer- G

Allows:

- *Reproducible antibiotic release*
- *Ease of use*
- *Maintenance of joint mobility*
- *Partial weight bearing with two crutches*
- *Limitation of scar formation or soft tissues contraction*

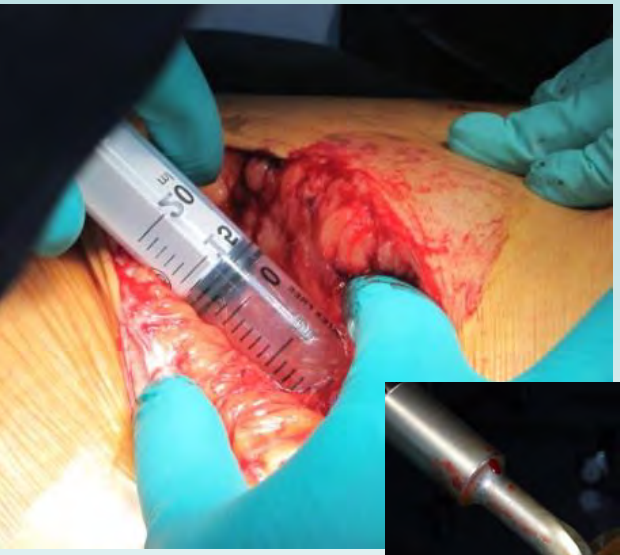

International Orthopaedics (SICOT)
DOI 10.1007/s00264-010-1172-8

ORIGINAL PAPER

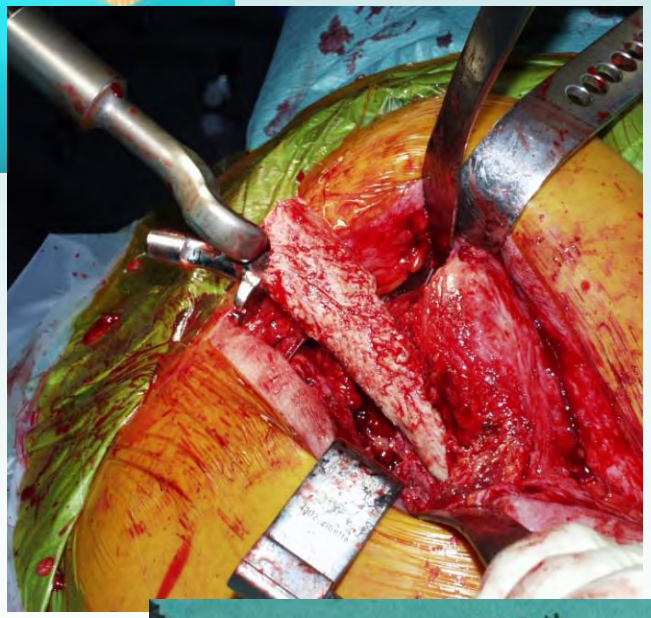
Preformed gentamicin spacers in two-stage revision hip arthroplasty: functional results and complications

Christophe Pattyn · Thomas De Geest · Pieter Ackerman · Emmanuel Audenaert

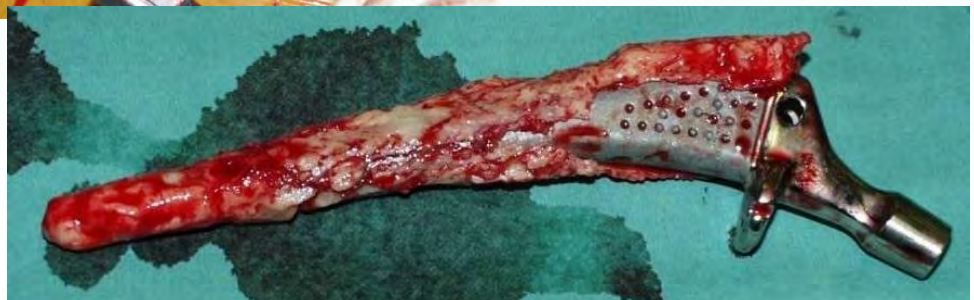
First stage



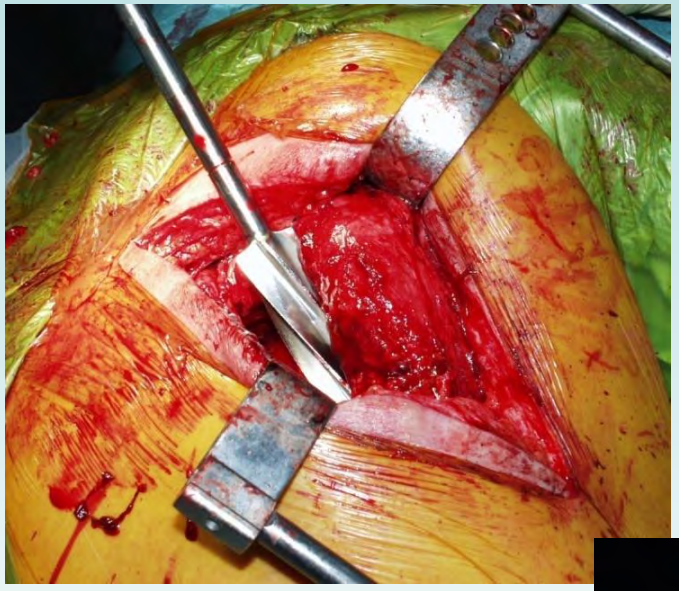
Intraoperative tissue samples



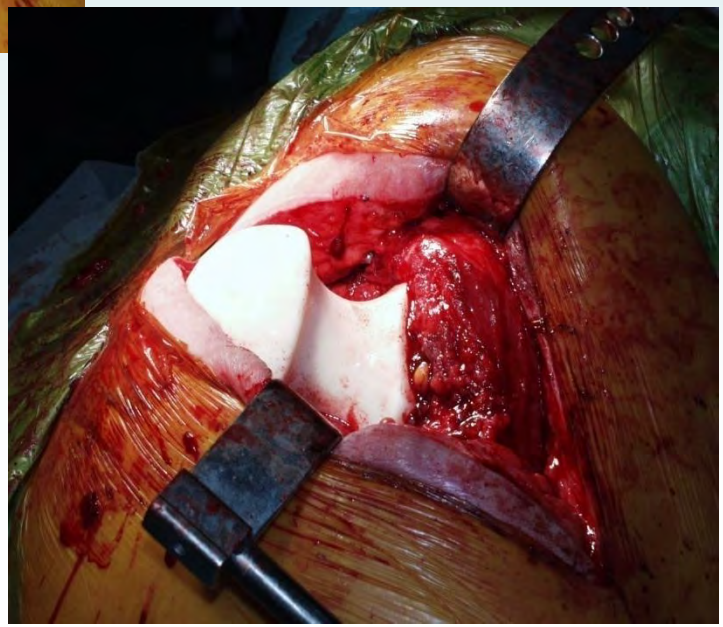
Prosthetic components removal



First stage



Accurate debridement



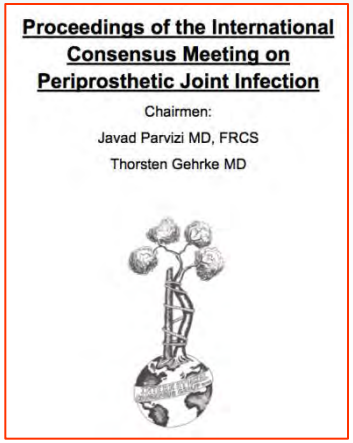
Spacer positioning

Consensus

More than three but **not more than six** distinct intraoperative tissue samples should be sent for aerobic and anaerobic culture.

Tissue or fluid samples from representative area preferably **from the interface**,

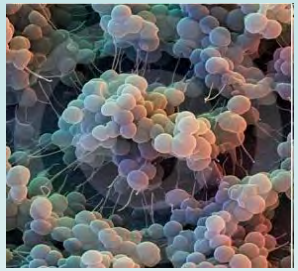
Each sample taken **with an unused instrument.**



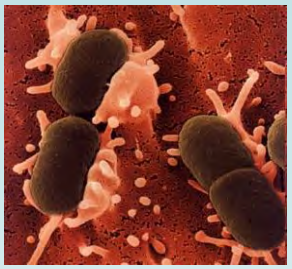
Microorganism

- *S. Aureus 10*
- *S. Epidermidis 7*
- *E. Coli 2*
- *S. Agalactiae 1*
- *S. Mitis 1*
- *S. Haemoliticus 1*
- *Polymicrobial infection 7*
- *Not identified 8 but associated to sinus tract*

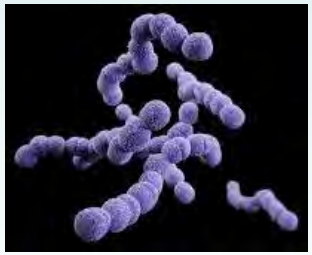
Staph. Aureus



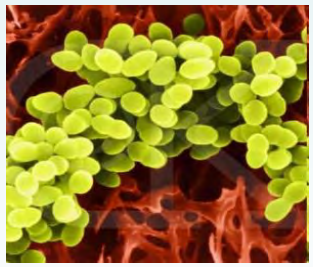
Staph. Epidermidis



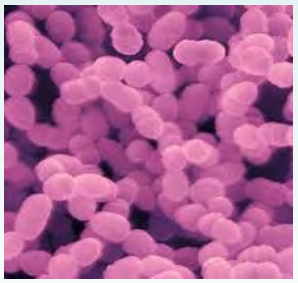
E. Coli



S. Agalactiae



S. Mitis



S. Haemoliticus

After first stage

- Antibiotic treatment was adjustified to culture results from deep-tissue sample obtain at first surgical stage.
- IV Antibiotic treatment was started.
- At the discharge oral antibiotics were prescribed by the infectivologist
- ERS & CRP were monitored every 2 weeks.

Second stage

The spacer was removed and definitive implant was realized

Only if inflammatory parameters returned to normality associated to clinical recovery

after 5 months (1 ÷ 13)

Interval between the two stages

There is no definitive evidence to the optimal time interval.

Reports varied from 2 weeks to several months.

Confidence 87%

Proceedings of the International Consensus Meeting on Periprosthetic Joint Infection

Chairmen:

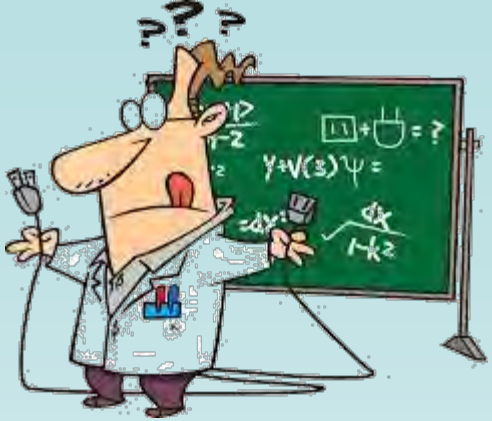
Javad Parvizi MD, FRCS

Thorsten Gehrke MD

After Second stage

Antibiotic treatment was continued for about 5 weeks (1-16)

Results



- *Mean FU 95 months (24-166)*
- *Preoperative: HHS 45 (13-77)*
- *At final FU: HHS 83 (35-96)*

Complications

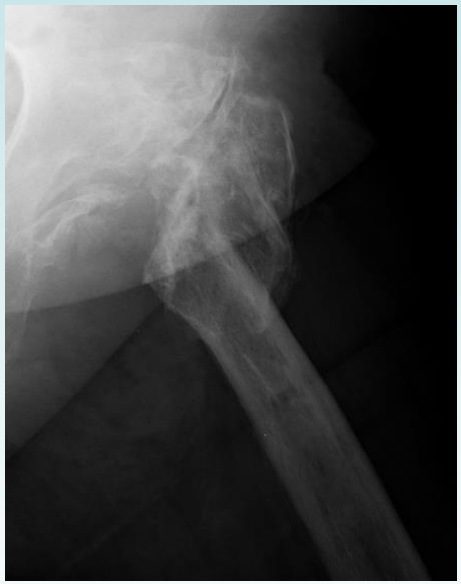
Total complications rate: 22.4%

✓RECURRENT INFECTION	2	5.4%
✓SPACER DISLOCATION:	4	11%
✓FEMORAL FRACTURE:	1	3%
✓FEMORAL ARTERY PSEUDO-ANEURYSM	1	3%

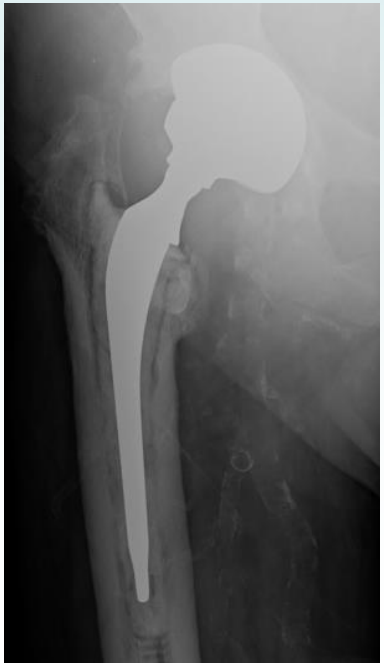
Recurrent infections

MRSA was isolated in both cases

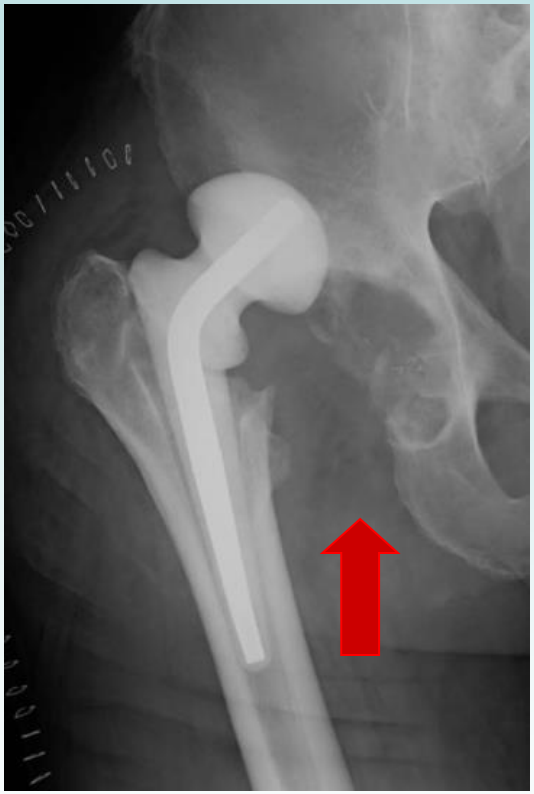
- ✓ *1 case was treated with Girdlestone resection arthroplasty*

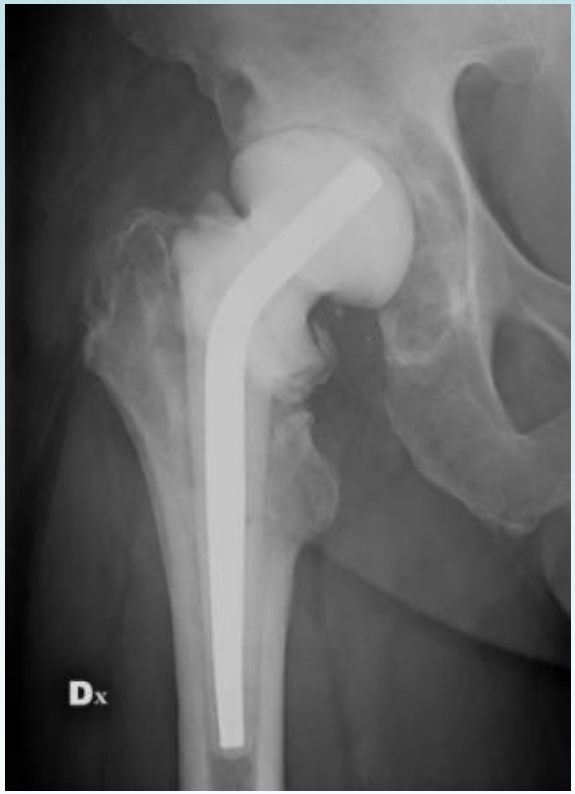


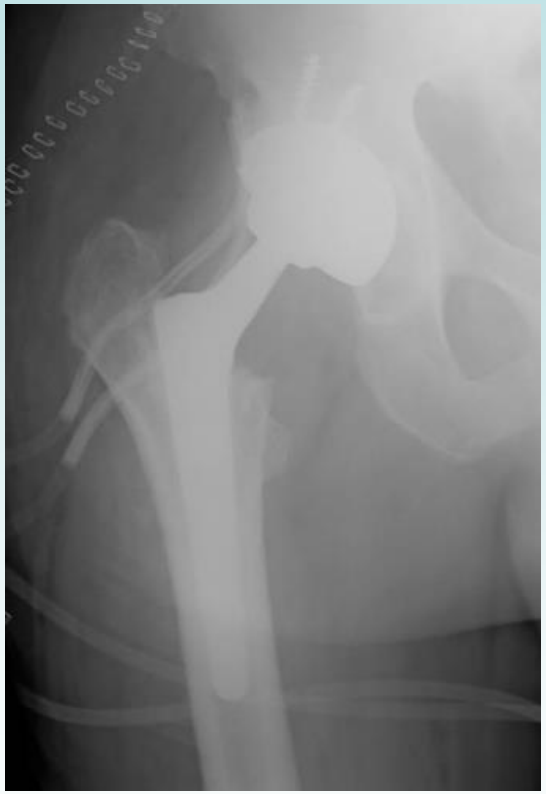
- ✓ *1 case refused a new surgery*



Spacer Dislocation







Proximal fixation with cement

Second stage

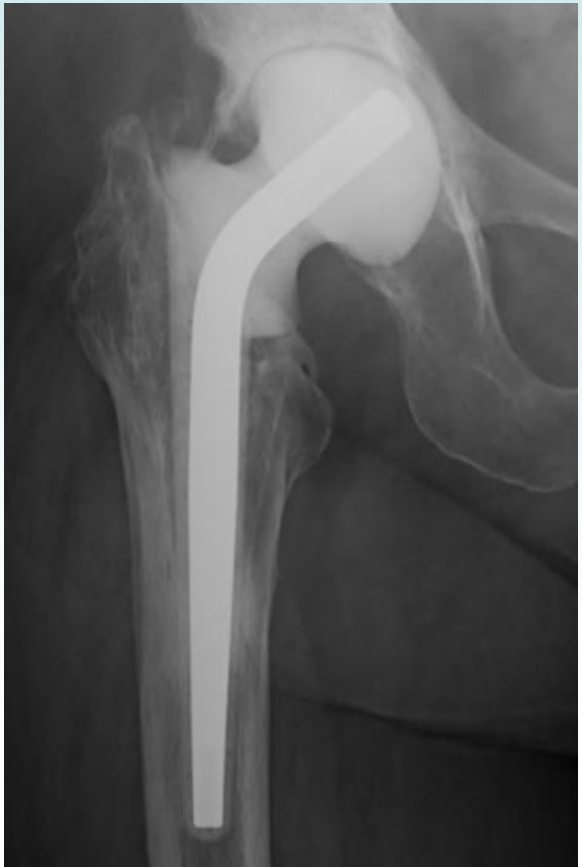
Second stage - Implants:

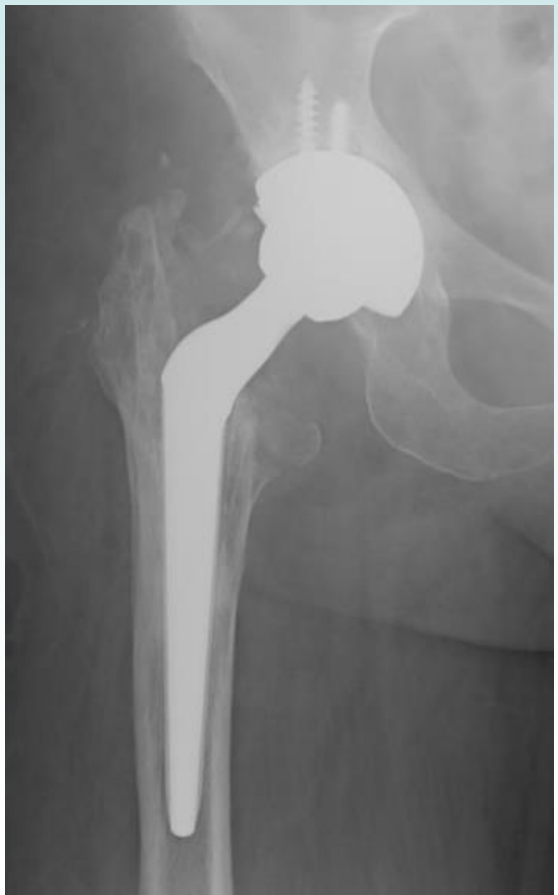
PRIMARY STEM	
CEMENTED	8
UNCEMENTED	9
REVISION STEM	19
PRIMARY CUP	29
REVISION CUP	7
NO SECOND STAGE	1

Effects on bone stock

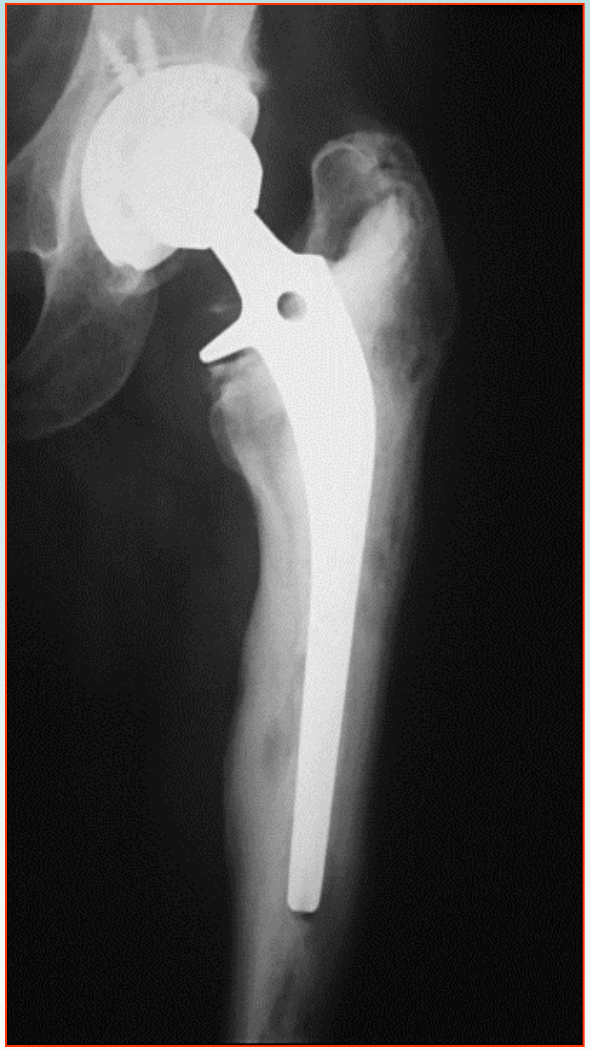
Spacer preserved acetabular bone stock

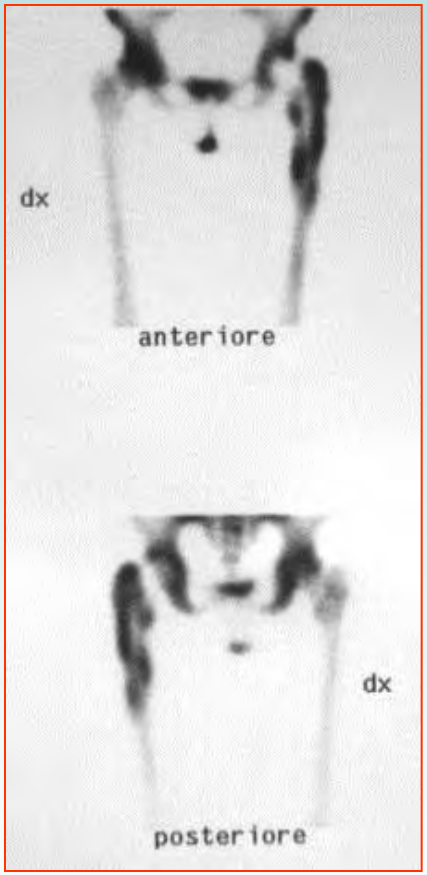
Primary cups in 78.4% of cases

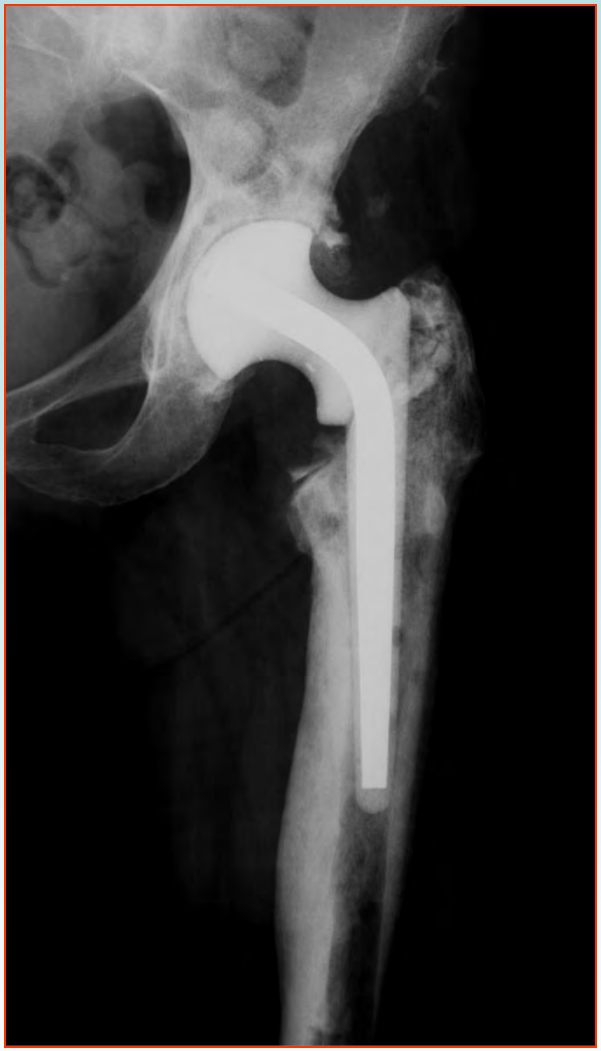




CJ: F, 71 yrs



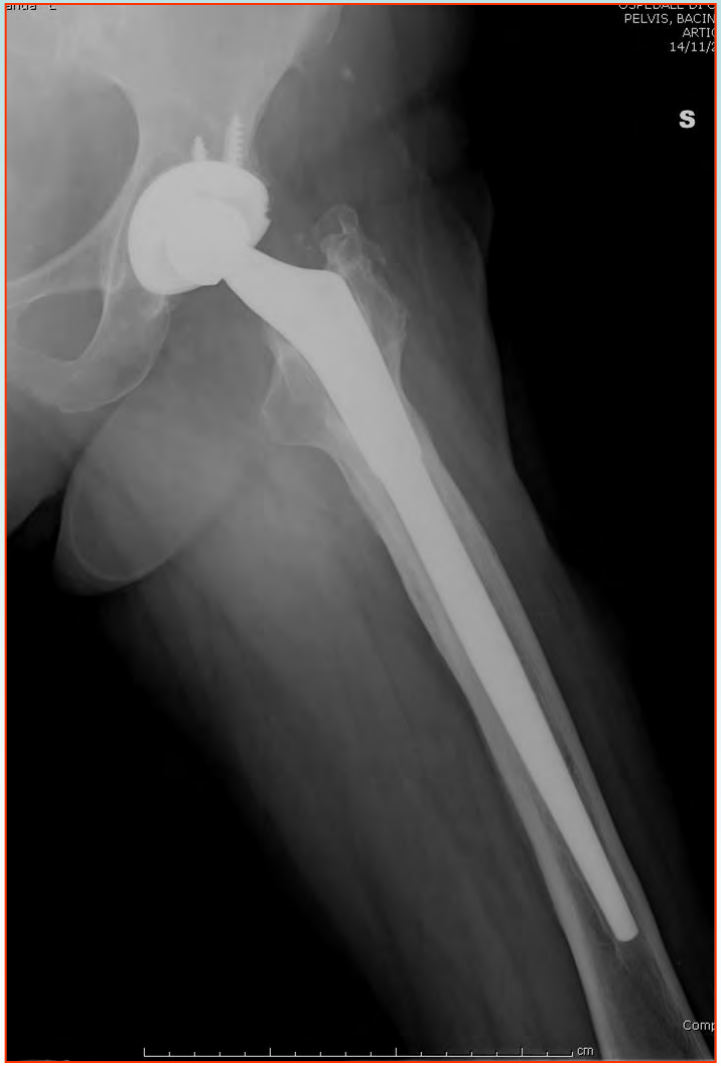


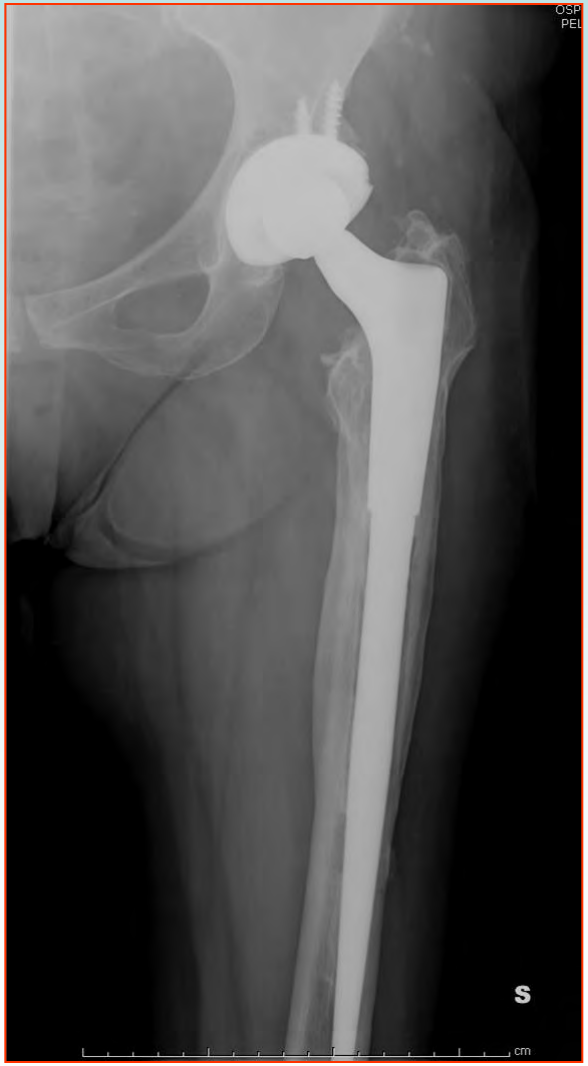


4 years from 1° implant

2°Stage @ 3months

CJ: F, 71 yrs





7 years F-U

Conclusion

- ✓ Reproducible Surgical Technique
- ✓ Shorter Surgical Time
- ✓ Higher Infection Eradication Rate
- ✓ Preservation of acetabular bone stock
- ✓ Better Functional Results

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Single Stage Exchange for the Infected THA

Professor Fares S Haddad BSc MD (Res) MCh (Orth) FRCS (Orth) FFSEM

Consultant Hip and Knee Surgeon

Divisional Clinical Director Surgical Specialties

University College London Hospitals, UK

Director, Institute of Sport, Exercise & Health

University College London

Disclosures

Editor in Chief:

Bone & Joint Journal

I receive Royalties from:

Smith & Nephew

Corin

I receive Institutional and Research Support from:

Smith & Nephew

Stryker

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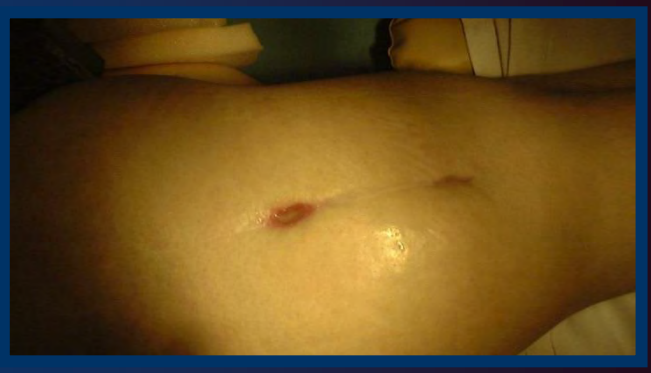
MatOrtho

NIHR

Periprosthetic Infection: The Challenge

- Eradication of infection
- Prevention of recurrence

- *Restoration of function*
- *Cost Containment*



Revision for Established Infection

Single Stage vs Multi Stage Revision

The Debate Continues

Principles

- Identification of infecting organisms

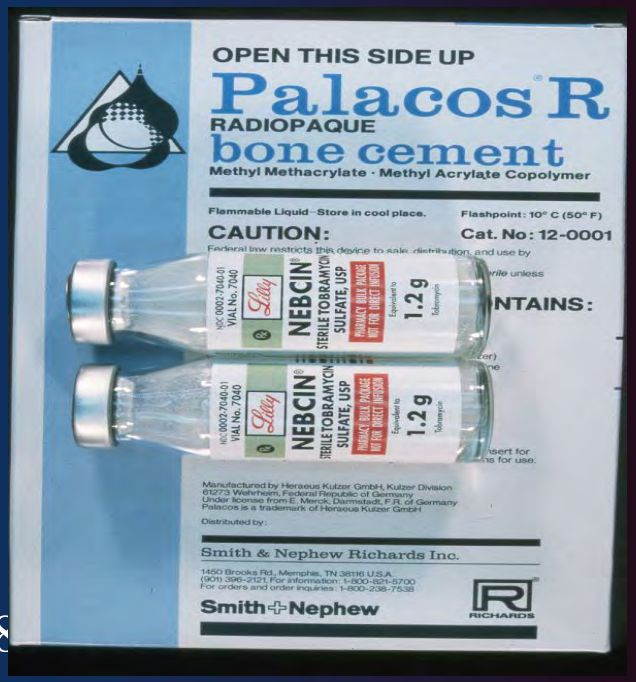
- Eradication of septic foci
- Physical removal of organisms /necrotic tissues / prostheses / cement
- Appropriate local and systemic antibiotic therapy

- Reconstruction into “healthy” bed

Single Stage Revision

- Good results based on knowing the organism(s) & the use of antibiotic loaded cement

- Endo-Klinik Experience
  - ✓ No difference between one and two stage
  - ✓ Initial success rates of 77%
  - ✓ Almost all patients get single stage
- Raut, Siney, Wroblewski. JBJS-B 1994
  - ✓ 183 infected THRs f-up >7years
    - ❖ 84% control of infection
- Raut, Siney, Wroblewski. Clin. Orthop. 1995
  - ✓ 57 cases with discharging sinuses
    - ❖ 86% control of infection
- Ure, Amstutz, Nasser, Schmalzried. JBJS-A, 1998
  - ✓ 20 patients over 11 years
  - ✓ No reinfections
- Callaghan, Katz & Johnston. Clin, Orthop. 1999
  - ✓ 24 patients f-up minimum 10 years
  - ✓ Recurrent infection 8.3%

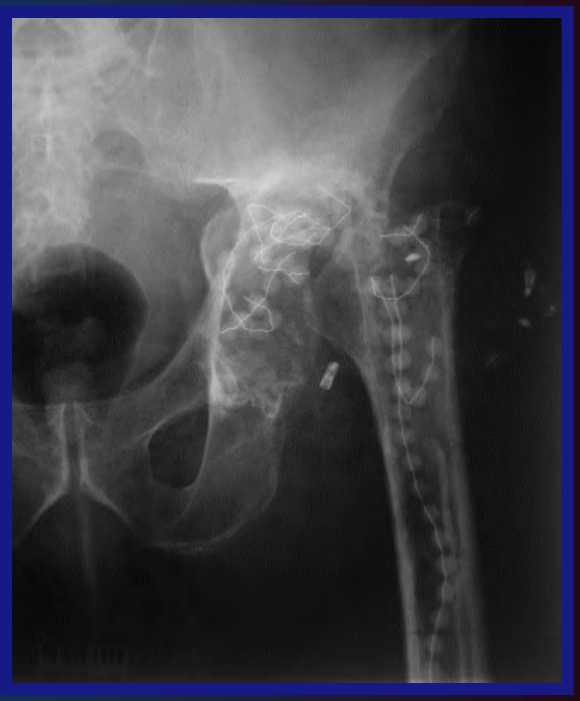


Single Stage – Systematic Review

Author	Year	Number of patients	Number of eradicated infections	Eradication rate (%)	Follow-up (months)		
					Min	Max	Mean
Total		**1454.00**	**1197.00**				
Minimum		8.00	-	50.00	12.00	37.00	19.00
Maximum		583.00	-	100.00	66.00	205.20	118.80
Mean		**58.16**	**-**	**82.32**	**29.10**	**119.38**	**67.22**
SD		113.04	-	-	15.49	45.81	27.27

"Gold Standard": Two-Stage Revision

- Highest eradication of infection
- Two chances at debridement
- Interval period is an opportunity to assess the response to antibiotics, and perform further microbiological / serological investigations
- Allows uncemented reconstruction
- Allows the use of allograft



Two Stage – Systematic Review

Author	Year	Number of patients	Number of eradicated infections	Eradication rate (%)	Follow-up (months)		
					Min	Max	Mean
Total		**3518.00**	**3197.00**		-	-	-
Minimum		5.00	-	64.29	12.00	36.00	19.00
Maximum		294.00	-	100.00	120.00	204.00	144.00
Mean		**52.51**	**-**	**90.88**	**30.47**	**111.78**	**58.36**
SD		52.39	-	-	18.53	42.69	24.44

■ HIP

A multidisciplinary team approach to two-stage revision for the infected hip replacement

A MINIMUM FIVE-YEAR FOLLOW-UP STUDY

M. S. Ibrahim,
S. Raja,
M. A. Khan,
F. S. Haddad

From University College London Hospitals, London, United Kingdom

We report the five year outcomes of a two-stage approach for infected total hip replacement. This is a single-surgeon experience at a tertiary centre where the more straightforward cases are treated using single-stage exchange. This study highlights the vital role of the multidisciplinary team in managing these cases.

A total of 125 patients (51 male, 74 female) with a mean age of 68 years (42 to 78) were reviewed prospectively. Functional status was assessed using the Harris hip score (HHS). The mean HHS improved from 38 (6 to 78.5) pre-operatively to 81.2 (33 to 98) post-operatively. Staphylococcus species were isolated in 85 patients (68%).

The rate of control of infection was 96% at five years. In all, 19 patients died during the period of the study. This represented a one year mortality of 0.8% and an overall mortality of 15.2% at five years. No patients were lost to follow-up.

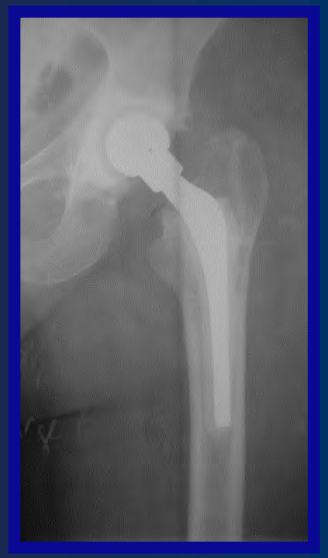
We report excellent control of infection in a series of complex patients and infections using a two-stage revision protocol supported by a multidisciplinary approach. The reason for the high rate of mortality in these patients is not known.

Cite this article: *Bone Joint J* 2014;96-B:1312–18

>15 % Mortality at 5 years

Interval Spacers / Prostheses have been very Successful

If we can leave foreign material in, then why not a definitive prosthesis?



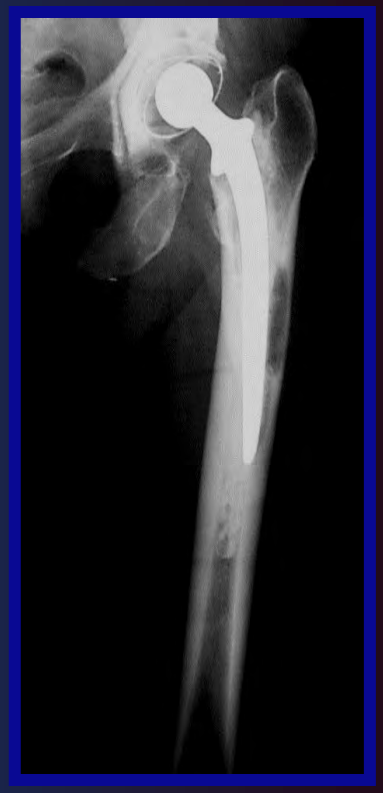
There is no absolute cut off on length of Interval Period or Antibiotic Treatment

If we can shorten the Interval Period, then why not get rid of the Interval?

Selective One Stage Exchange

Single Stage Revision UCLH Protocol

- Non immuno-compromised patients
- Healthy soft tissues
- Minimal / moderate bone loss
- Organism known
- Sensitivities known
- Appropriate antibiotic(s) available
- Antibiotic loaded cement (femoral at least)

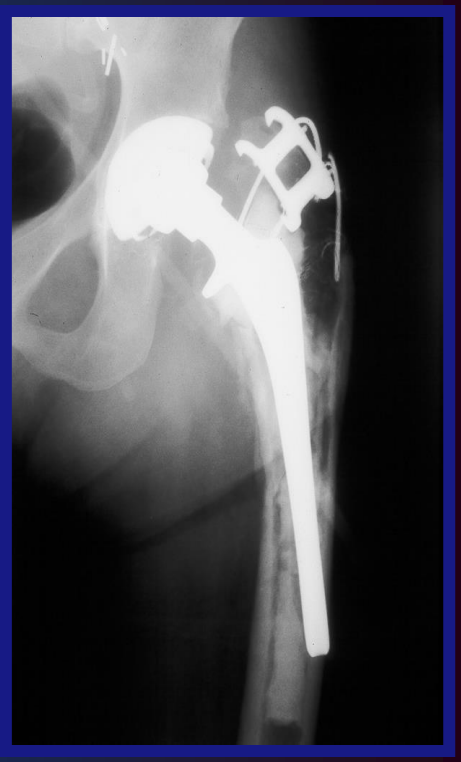


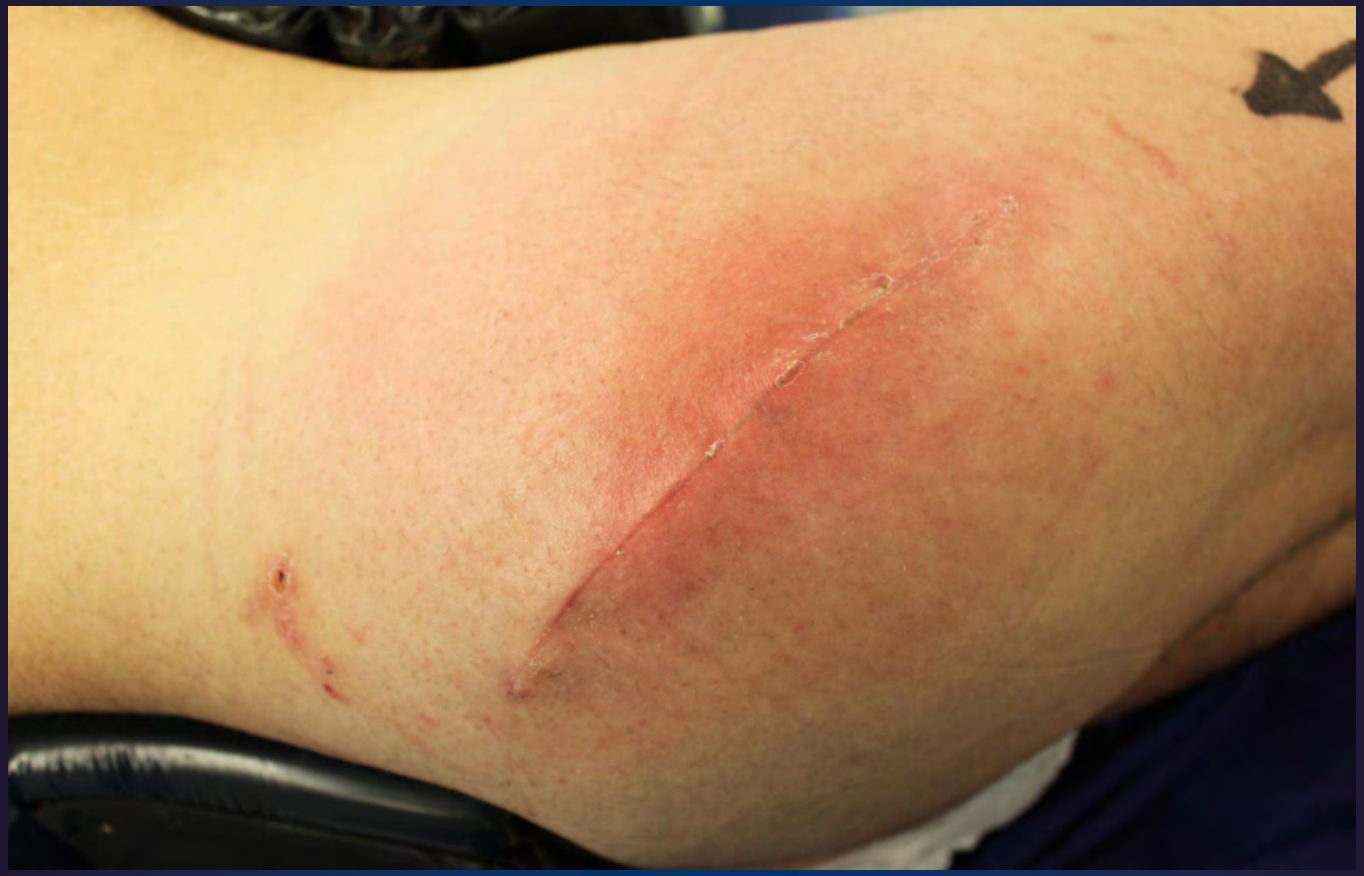
Single Stage Revision UCLH Protocol

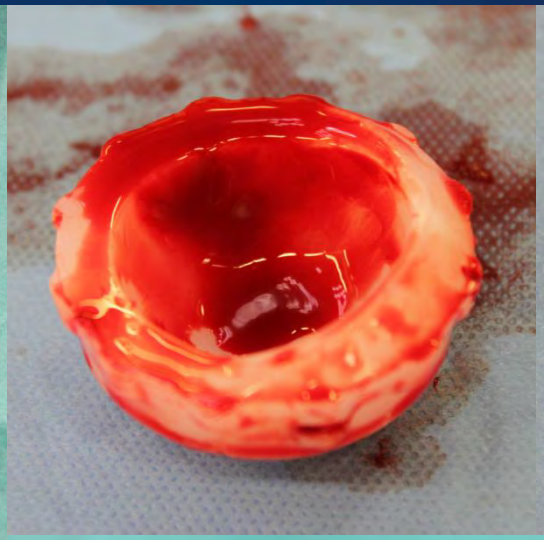
- Standard debridement and lavage
- Multiple samples to micro – minimum 5

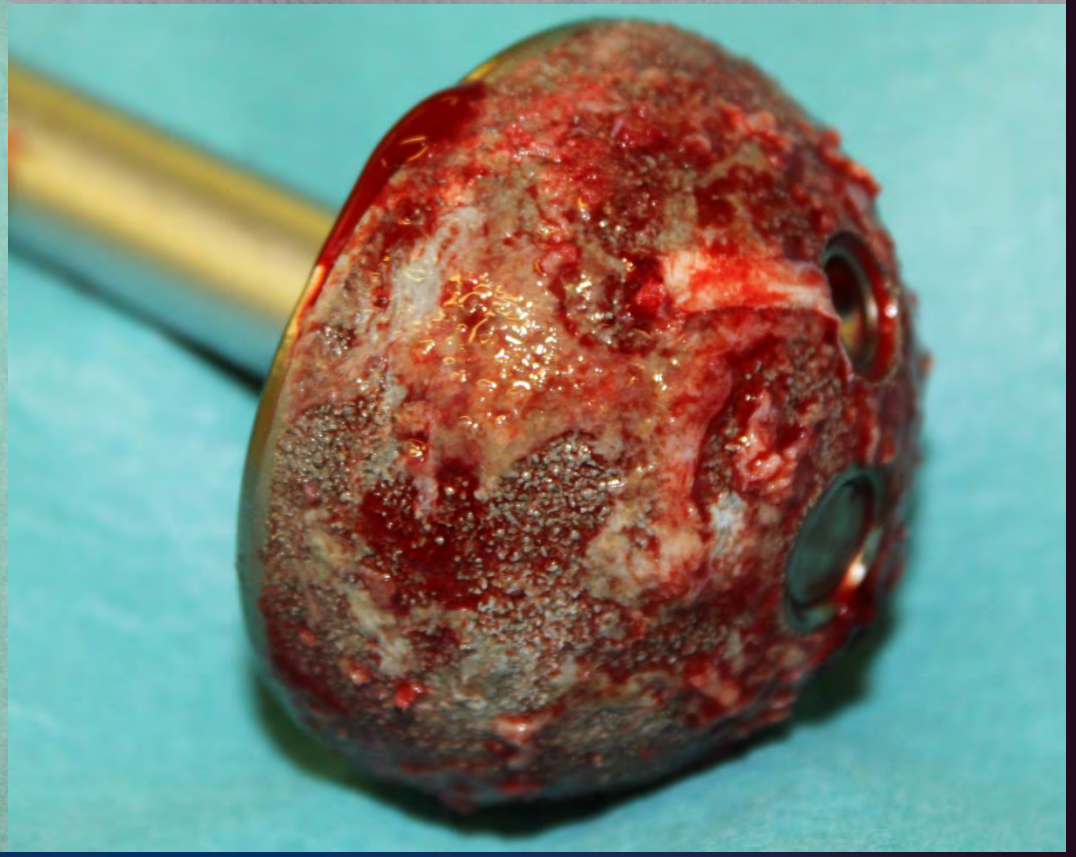
- Redrape / new instruments
- Immediate reconstruction
- Antibiotic loaded cement / bone graft

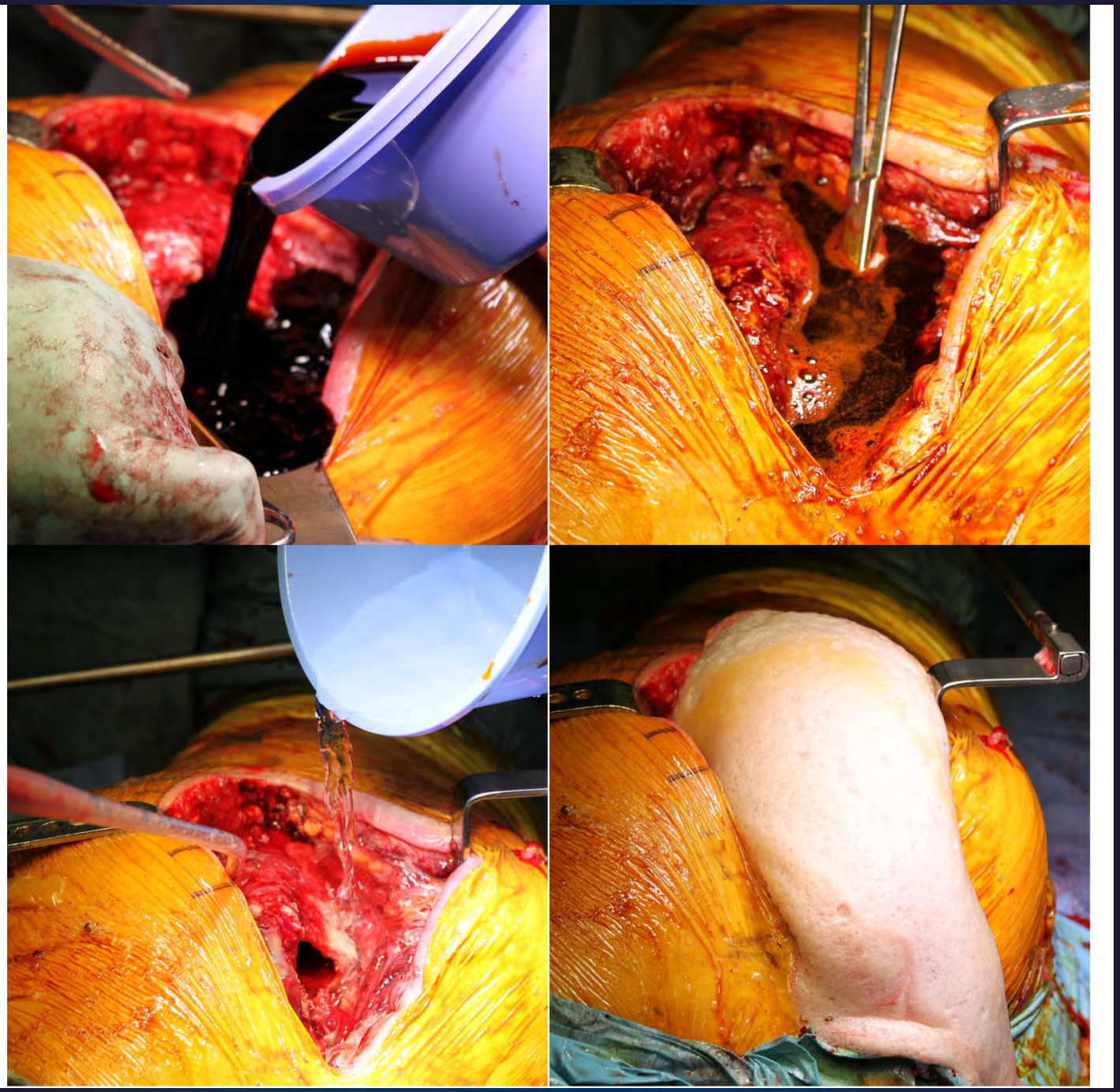
- 5 days iv antibiotics then review full micro. data
- 6 weeks minimum antibiotics
- Serial ESR, CRP, nutritional markers…

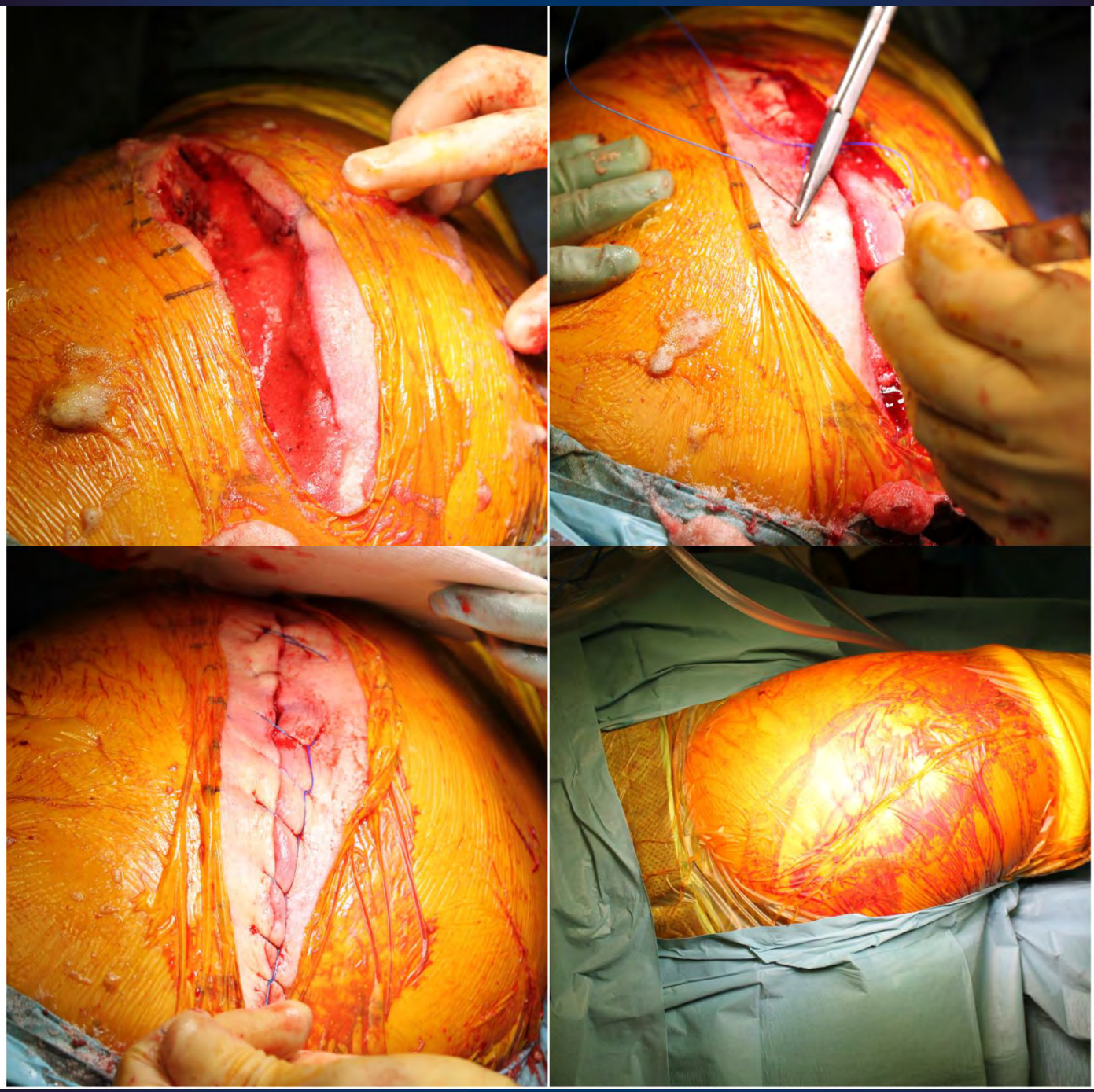


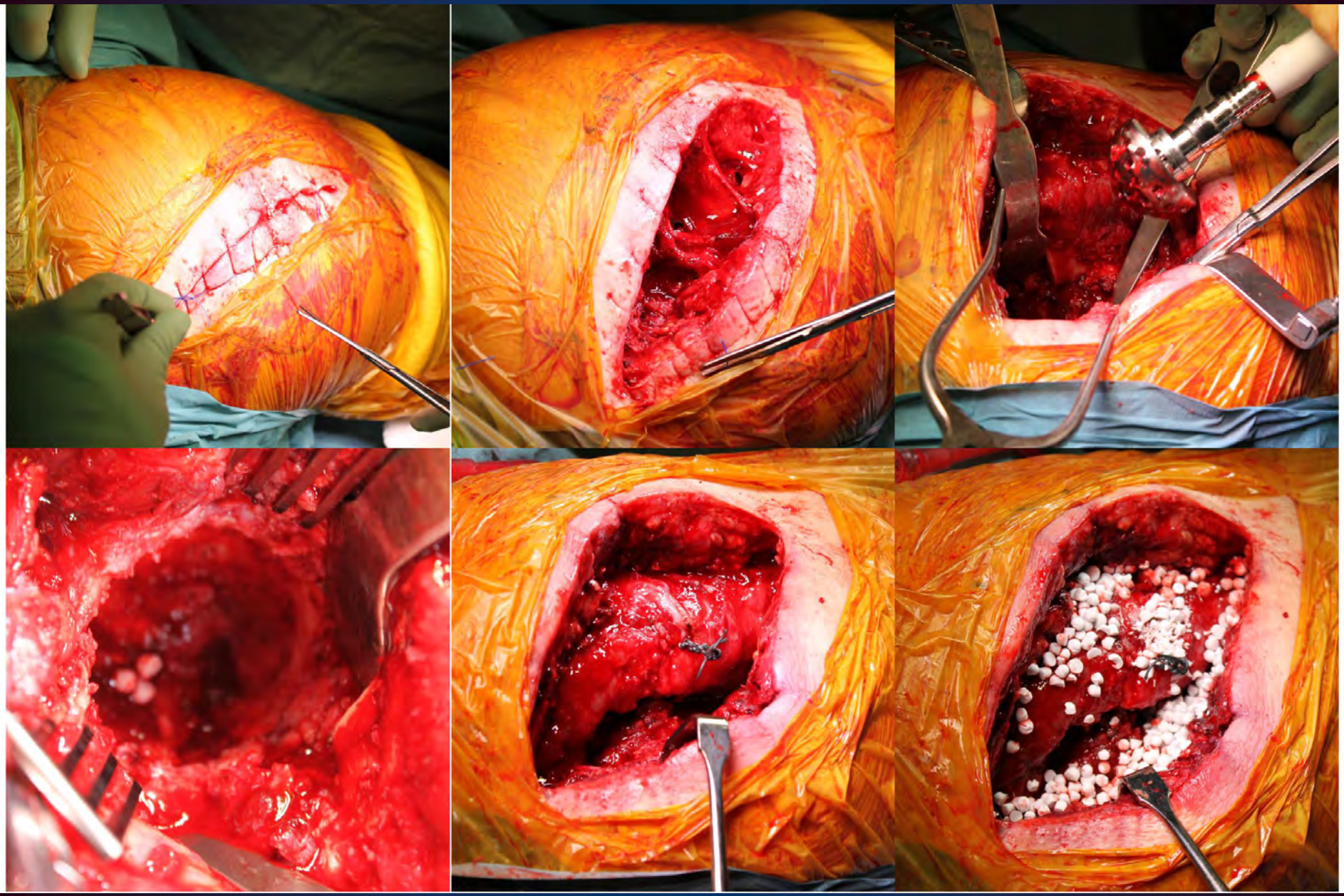


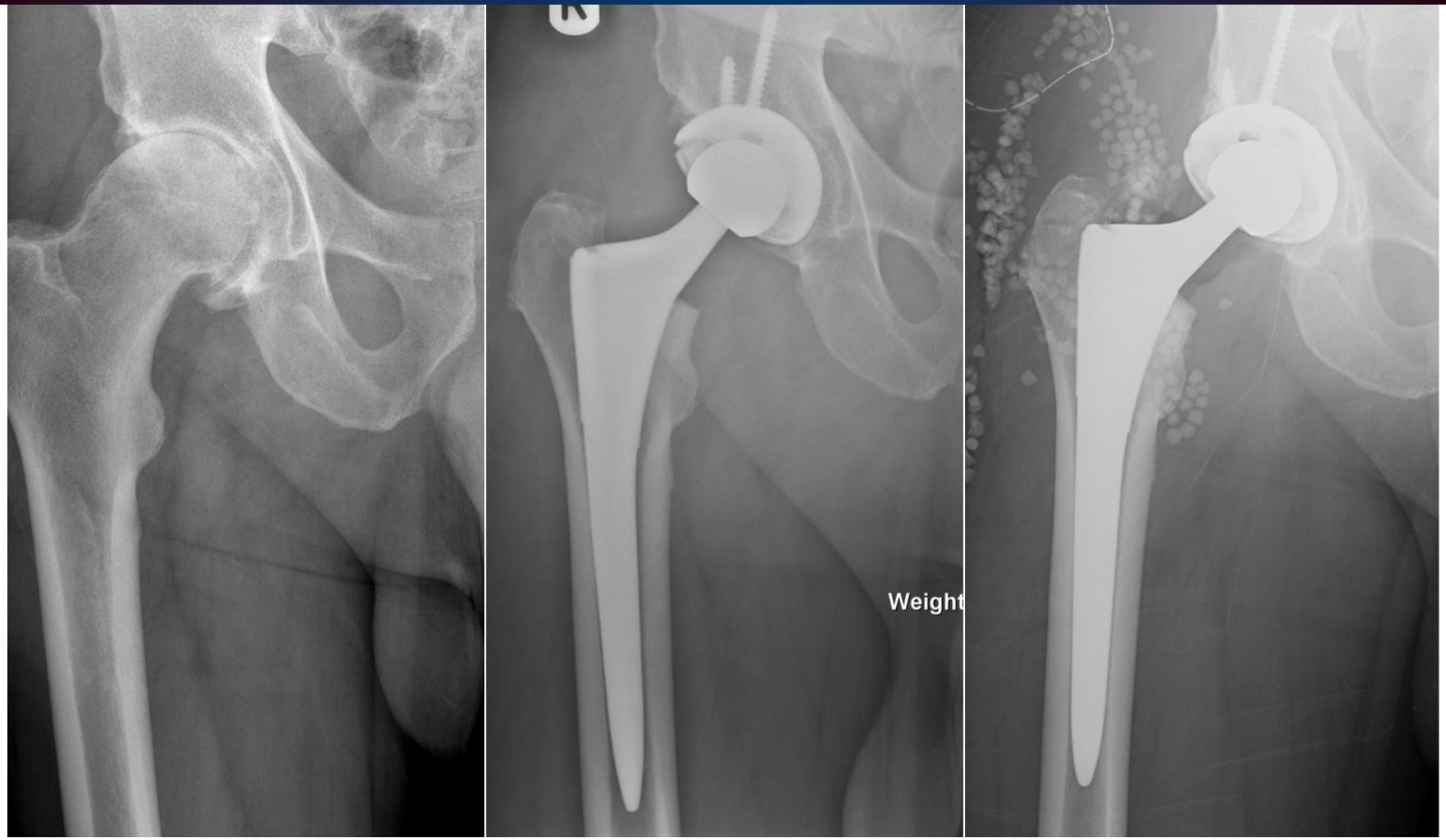






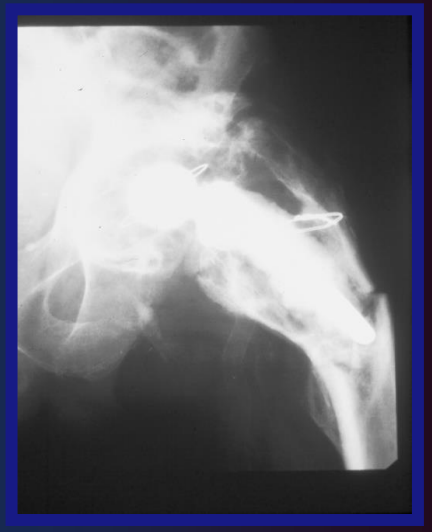


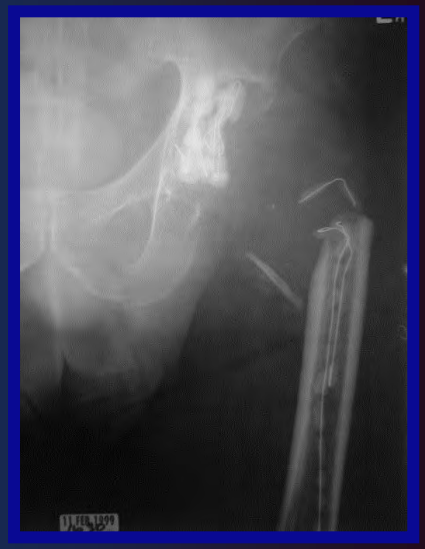



Weight

Two-Stage Revision

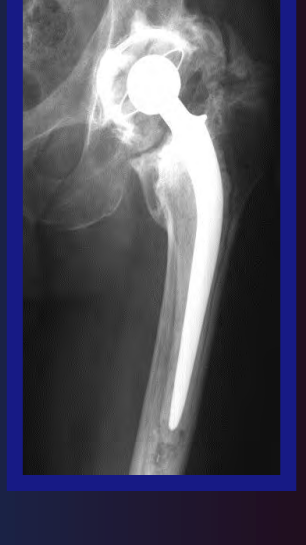
- All complex cases
  - ✓ The patient
    - ❖ Immunosuppressed
    - ❖ Systemic disease
    - ❖ Concurrent sepsis
    - ❖ Reinfection
  - ✓ The anatomy
    - ❖ Bone loss
  - ✓ The organism
    - ❖ Polymicrobial infection
    - ❖ MRSA / MRSE
    - ❖ Unusual commensals
    - ❖ Unusual resistance profiles
    - ❖ No organism





UCLH Data

- 50 consecutive patients revised for infected THR
  - ✓39 Two-Stage revisions
  - ✓11 One-Stage revisions
    - All femoral components cemented
    - 6 cementless acetabular components



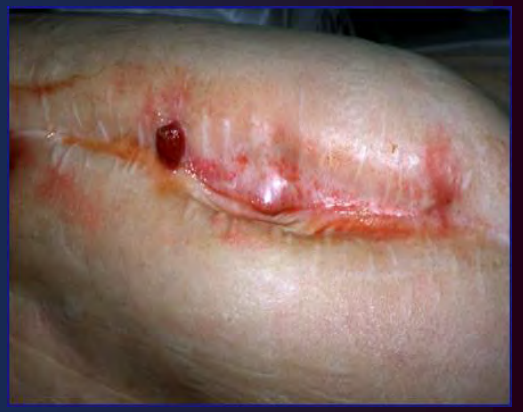
- Minimum 60 months follow-up
- All patients still under review

Oussedik, Dodds, Haddad – JBJS – B; 20

UCLH Data – 5 year F-Up

	Single-Stage	*Two-Stage*
Patients	11	39
Recurrent Infection	0	2
Hip Score Pre	40	36
Hip Score Post – 5 year	88	75
Satisfaction	8.5	6.9

UCLH Data



- Updated Outcomes
- Minimum 2 year F-up
- 43 1 stage exchanges
  - ✓1 case required 3 washouts / debridements
  - ✓1 case required 1 washout
- 142 2 stage / multistage revisions
  - ✓5 reinfections
  - ✓4 debridements

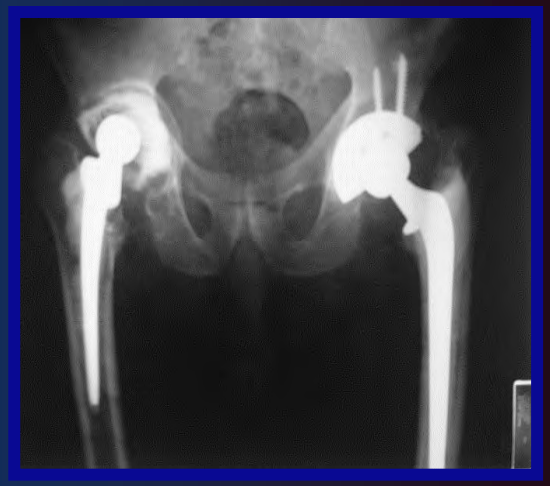
There is also Data from Inadvertent Single Stage Revision

- *UCLH Revision Hip and Knee Database 1999-2011*
- Infection diagnosed on the basis of > 2 positive cultures out of 5 with same organism and anti-biogram

- 19 cases (12 hip, 7 knee)
  - ✓ "Significant infection" only diagnosed post-op - inadvertent single stage revision
  - ✓ No post-operative infections

Single Stage Revision – in Appropriate Patients

- Social and economic advantages



- Only one operation!
- Shorter hospitalisation
- Earlier return to activity
- Higher satisfaction rates
- Better early function
- No price to pay in terms of reinfection thus far

- *If patients are given the odds, they will usually choose to have a single procedure*

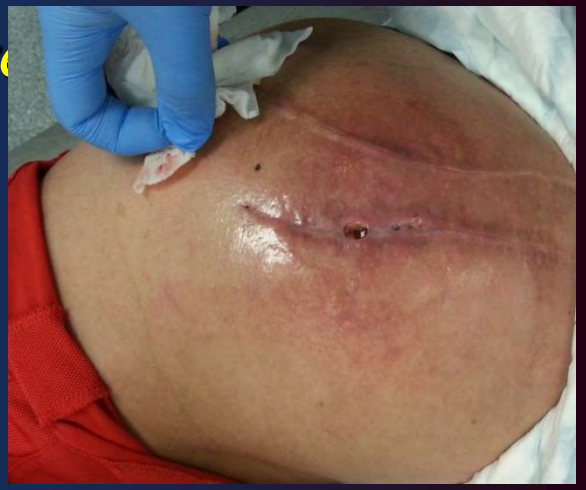
Conclusion

Periprosthetic Infection: Goal setting

- What problem(s) does the patient want addressed?
- Is it technically possible?
- Is the cure worse or better than the disease?
- Do I have the resources and expertise:
  - ✓Personally?
  - ✓Within my team/hospital?
- What will the next operation be after this one?

UCLH: Current Solution

Selective Strategy – Individualised Car



- Uncomplicated patient, anatomy and organism
  - ✓ Single Stage Revision
  - ✓ >20% of cases

- Complex case
  - ✓ Two Stage Revision with Antibiotic Loaded Spacers

Key Message

Single Stage Revision should have an increasing role

Thank You

University College Hospital
London, UK

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY


WHATEVER YOU DO
ALWAYS GIVE
100 %
UNLESS YOU'RE
DONATING
BLOOD

Comparable blood loss after THA with dabigatran, enoxaparin and rivaroxaban.

Results of a randomised clinical trial.

MK Wasko, K Bobecka-Wesolowska, I Pokrzywnicka-Gajek, J Kowalczewski
Department of Orthopaedics and Rheumoorthopaedics
The Medical Centre of Postgraduate Education in Warsaw, Poland

International combined BHS/SIDA meeting, Milan, Italy – 26/11/2015

Background

THA:

- **DVT – 8.9%**
- **symptomatic non-fatal PE – 1.9%**
- **fatal in-hospital PE – 0.05%**

O'Reilly et al. *Med J Austr* 2005

Local guidelines

- **mechanical prophylaxis recommended**
- **pharmacological prophylaxis obligatory in all THA patients**

Maldyk et al. *Ortop Traumatol Rehab* 2012

Objectives

Objectives

- to compare total blood loss between three different thromboprophylactic regimes

Objectives

- to compare total blood loss between three different thromboprophylactic regimes

- to evaluate the incidence of wound healing disturbances.

Methods

Study

- **single – centre, parallel – group**

Study

- **single – centre, parallel – group**
- **blinded assessors and analysts**

Study

- **single – centre, parallel – group**
- **blinded assessors and analysts**
- **university hospital**

Study

- single – centre, parallel – group
- blinded assessors and analysts
- university hospital
- no changes to trial design

Study

- single – centre, parallel – group
- blinded assessors and analysts
- university hospital
- no changes to trial design

- ClinicalTrials.gov identifier: NCT02085824

Study

- single – centre, parallel – group
- blinded assessors and analysts
- university hospital
- no changes to trial design

- ClinicalTrials.gov identifier: NCT02085824
- no external funding.

Participants

- 60 adult patients with end-stage hip OA
  - men > 18 yo
  - postmenopausal women

Participants

- 60 adult patients with end-stage hip OA
  - men > 18 yo
  - postmenopausal women
- same-implant (BiContact/ScrewCup, Aesculap, Tuttlingen, DE)

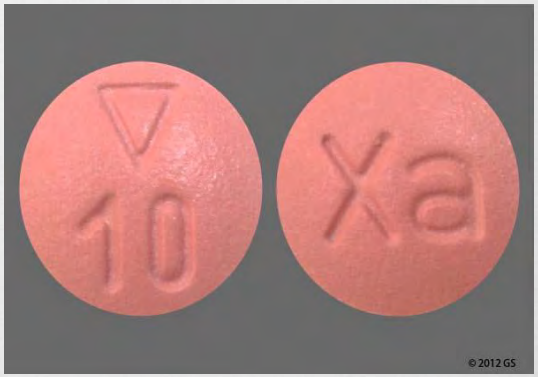
Participants

- 60 adult patients with end-stage hip OA
  - men > 18 yo
  - postmenopausal women
- same-implant (BiContact/ScrewCup, Aesculap, Tuttlingen, DE)
- same surgical care, rehab protocol, pain protocol.

Exclusion criteria

- revision THA
- any surgery / procedure within 3 months
- bleeding disorders
- renal and hepatic failure
- NSAIDs

Intervention



dabigatran	enoxaparin	rivaroxaban
-	40 mg 1x1 *sc* preop	-
110 mg 1x1 *po* 6h postop	40 mg 1x1 *sc* @ 8 pm	10 mg 1x1 *po* 6h postop
220 mg 1x1 *po* - 30 days	40 ms 1x1 *sc* – 30 days	10 mg 1x1 *po* – 30 days

no tranexamic acid or reinfusion drains used

Outcomes

- **blood loss calculated with Nadler formula [Nadler et al. *Surgery* 1962]**

Outcomes

- **blood loss calculated with Nadler formula [Nadler et al. *Surgery* 1962]**

- **wound healing disturbances with CDC surgical site infection definition [Mangram et al. *J Chemother* 2001].**

Sample size

- To detect a **350 ml** difference with a two-sided 5% significance level and a power of 80%, a sample size of 20 patients per group was necessary, given an anticipated dropout rate of 10%.

Sample size

- ~~To detect a 350 ml difference with a two-sided 5% significance level and a power of 80%, a sample size of 20 patients per group was necessary, given an anticipated dropout rate of 10%.~~

- **effect size calculation:**
  - f=0.408*d/sqrt(MSE)
  - d – 350 ml
  - MSE – mean squared error (for 3 groups in a pilot study)

Cohen, *Statistical power analysis*, 1988

Randomisation and blinding

- Participants were randomly assigned following simple randomization procedures (computerized random numbers) to 1 of 3 treatment groups

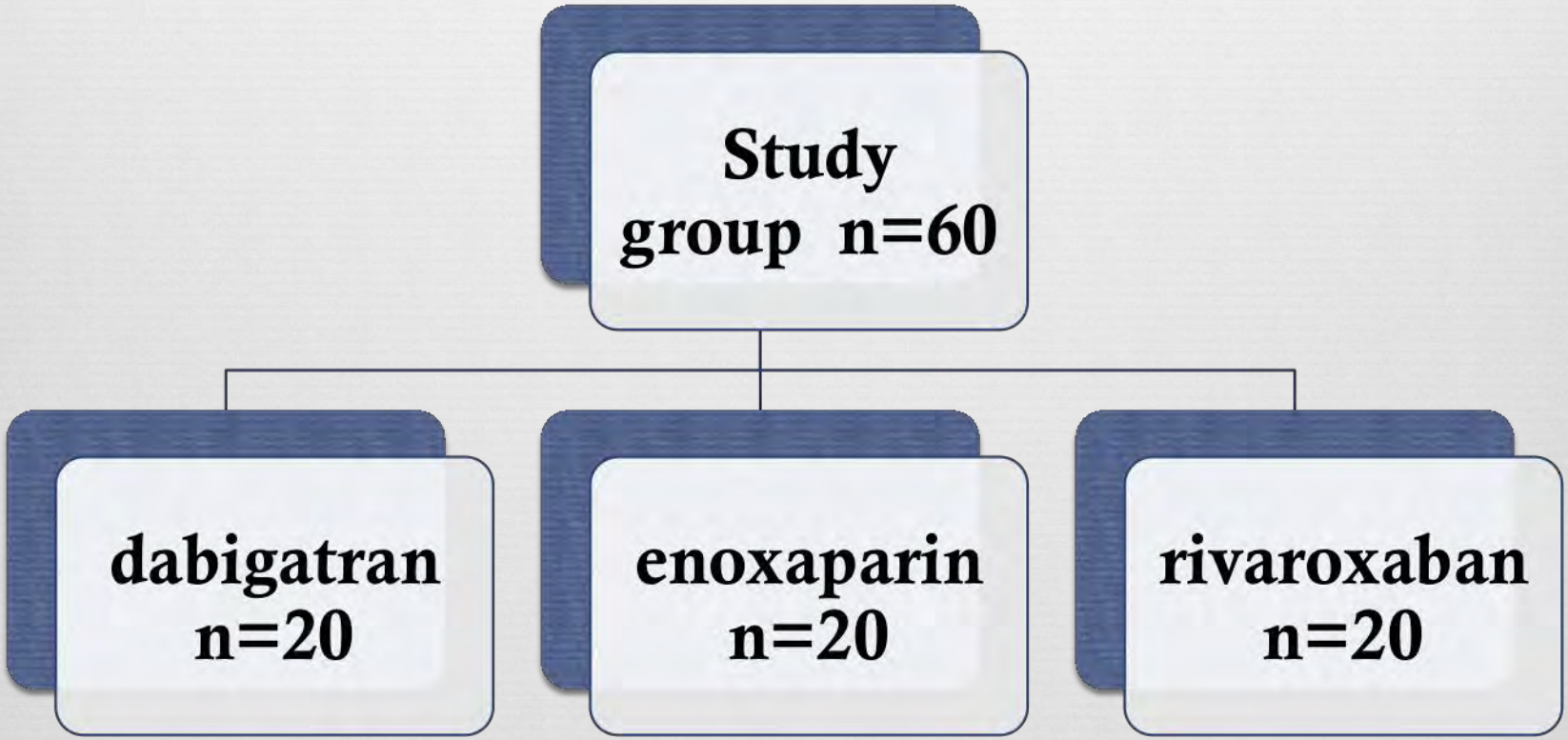
Randomisation and blinding

- Participants were randomly assigned following simple randomization procedures (computerized random numbers) to 1 of 3 treatment groups

- Whereas patients and physicians allocated to the different intervention groups were aware of the allocated arm, outcome assessors and data analysts were kept blinded to the allocation.

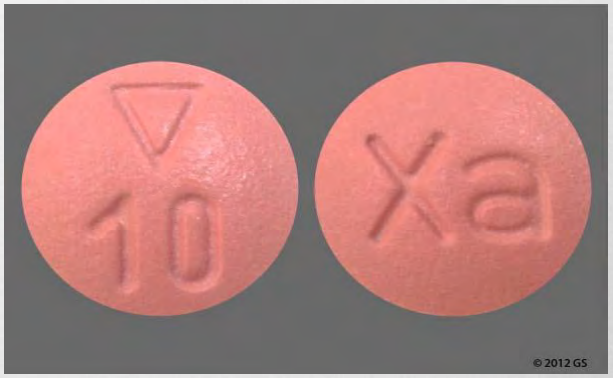

Results

Participant flow



September 2013 – July 2014

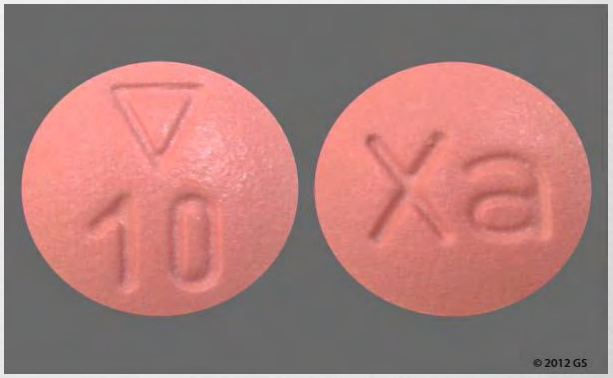
Blood loss



dabigatran	enoxaparin	rivaroxaban
854 ± 205 ml	**844 ± 222 ml**	**806 ± 227 ml**
95% CI: 730 – 976 ml	95% CI: 712 – 866 ml	95% CI: 649 – 988 ml

Kruskall-Wallis, p=0.92

Wound healing disturbances



dabigatran	enoxaparin	rivaroxaban
3	2	5

chi-squared, p=0.43

Discussion

Limitations

(1) small sample size
for wound healing disturbances

Limitations

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(2) no covariates for wound healing disturbances

Limitations

(1) small sample size
for wound healing disturbances

(2) no covariates for wound healing disturbances

(3) no tranexamic acid used.

Generalisability

- representative patient population
- our exclusion criteria banned only 2 of all consecutive patients from entering the trial

Pre-op start of prophylaxis

- **does not alter the total blood loss**

Clin Orthop Relat Res (2012) 470:2591–2598
DOI 10.1007/s11999-012-2320-9

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

CLINICAL RESEARCH

Blood Loss in Cemented THA is not Reduced with Postoperative Versus Preoperative Start of Thromboprophylaxis

Pål O. Borgen MD, Ola E. Dahl MD, PhD,
Olav Reikerås MD, PhD

Interpretation

None of the drugs (dabigatran, enoxaparin, rivaroxaban) offers reduced postoperative bleeding.

Interpretation

None of the drugs (dabigatran, enoxaparin, rivaroxaban) offers reduced postoperative bleeding.

There seems to be more wound healing disturbances in the oral anticoagulants group.

Jameson et al. *J Bone Joint Surg* 2012

Thank you

Grazie!


Questions?

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

A systematic review of pain assessment and analgesia in patients with cognitive impairment and neck of femur fractures

Miss Charlotte Yates[1]; Miss Kathryn Dyson[1]; Mr Warran Wignadasan[1]; Rachel Clarkson[2]; Mr Will Eardley[2]; Mr Jitendra Mangwani[1]; Mr Peter Smitham[3]; Mr Jeya Palan[1]

[1]University Hospitals Leicester, Leicester

[2]James Cook University Hospital, Middlesbrough

[3]Royal National Orthopaedic Hospital, Stanmore

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Conflicts of interest

- No disclosures

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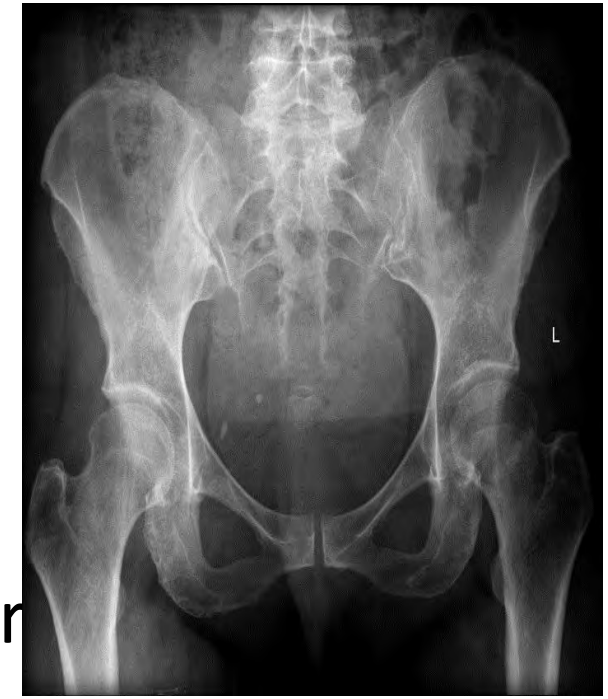
Introduction

- Hip fracture per annum:
  - **80,000**[1] in Italy
  - **70,000 - 75,000**[2] in the UK
- Costs the NHS £2 billion[2] per year
- 30% have dementia or cognitive impairment[1,3]



(1) Tirelli A, D'Amico MP, Gimigliano F, Iolascon G. P22 - Cognitive Impairment in Hip Fracture Patients. *Clinical Cases in Mineral and Bone Metabolism*. 2010;7(3):228.

(2) Hip Fracture Costing Report- Implementing NICE Guidance. 2011; Available at: http://www.nice.org.uk/guidance/cg124/resources/cg124-hip-fracture-costing-report2. Accessed 17/4/2015.

(3) Abou-Setta AM, Beaupre LA, Rashiq S, Dryden DM, Hamm MP, Sadowski

- Assessment
  - Visual analogue score/Pain score (Cognitively Intact)
  - ?Assessment tool (Cognitively Impaired)

- Management
  - Analgesic ladder
  - Opiates gold standard (?)
  - IlioFascial blocks

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Aims and objectives

- Pain assessment tool
- Pain management

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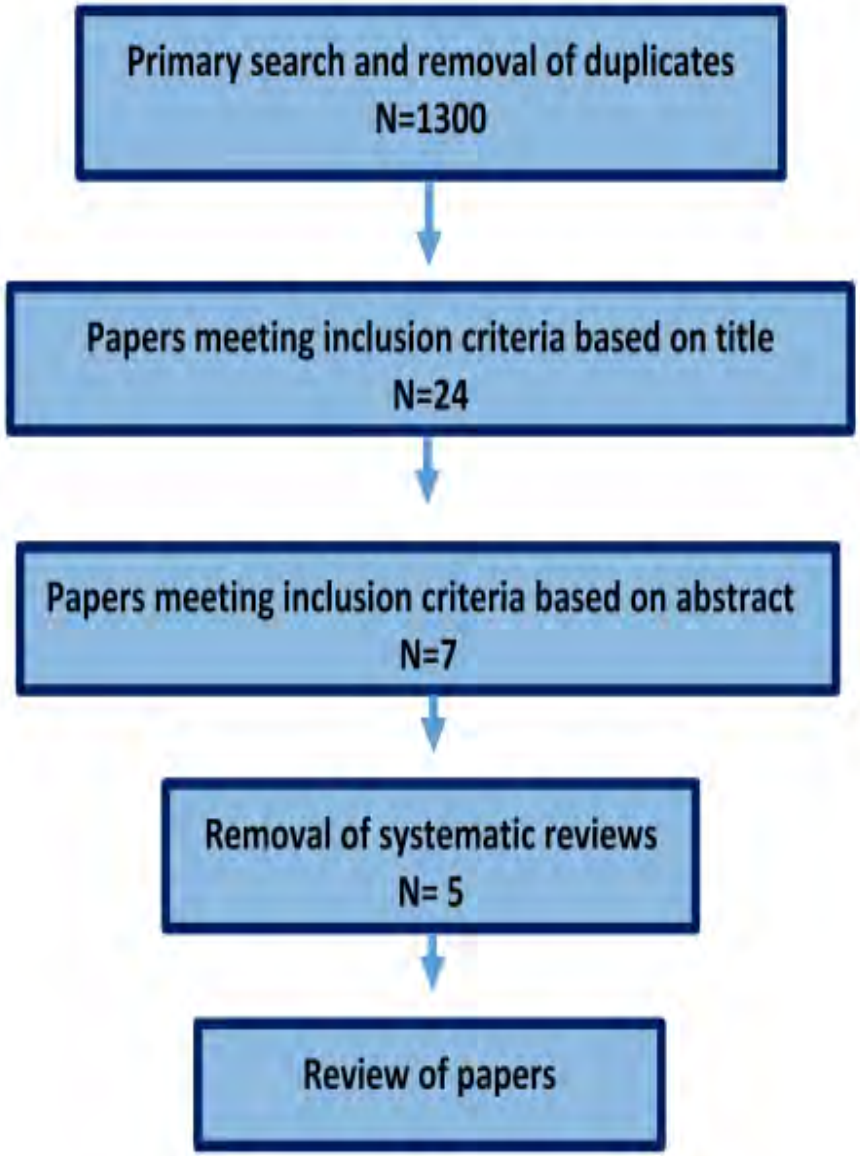
Methodology

- Followed PRISMA[4]
- PubMed, PsycInfo, PsycEXTRA, PsycArticles



(4) Alessandro Liberati M, DrPH, Douglas G. Altman D, Jennifer Tetzlaff B, Cynthia Mulrow M, MSc, Peter C. Gøtzsche, MD, DrMedSci, MSc, John P.A. Ioannidis M, et al. The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration PRISMA: Explanation and Elaboration. 2009;Annals of Internal Medicine:18/4/A264-5

Figure 1. A flow diagram to summarise the method used for inclusion of articles

Key search terms

- Dementia
- Alzheimer's
- Cognitive Impairment
- Pain Assessment
- Pain Assessment Tool
- Surgery
- Analgesia

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Inclusion criteria

- Human subjects
- **Pre-existing dementia or cognitive impairment**
- Adult subjects
- Paper written in English
- Acute pain
- Pain assessment or specific pain assessment tools
- Pain management

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Results and Discussion

- Initial search 1300 results
- Inclusion criteria 24 results
- Removal of systematic reviews
- Only 5 met the inclusion criteria after abstract review

Pain assessment

Paper	Prospective/ retrospective	Aim:	Number of patients	Follow up period	Recommendations/ conclusions	Level of evidence
1	Retrospective	Discuss development of an objective pain assessment tool	224	2/6/11 to 2/6/12	Adopt or develop tool	III
2	Descriptive	Evaluate PAINAD (Pain assessment in advanced dementia)	25	10/7/04 to 15/2/05	PAINAD valid and reliable Better pain assessment	III

Pain management

Paper	Prospective/ retrospective	Aim:	Number of patients	Follow up period	Recommendations/ conclusions	Level of evidence
3	Prospective	Determine relationship between opioid consumption and cognitive impairment	236	April 2005- July 2009	Dementia was associated with less opioid use.	II
4	Prospective	Objectively assess effectiveness of a block	30	consecutive patients into ED	Improvements provided by the block may aid patient care	III
5	Retrospective	Characterize patterns of opioid analgesia in elderly patients	184	2 year period - consecutive	Pain management suboptimal. Adopt	III

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PAINAD

- Observational tool
- 5-items (Each item: 0-2; Total Score 0-10)

- Breathing
- Negative vocalisation
- Facial expressions
- Body Language
- Consolability

Iliofascial block

- Regional anaesthesia
- Anatomical or US guided approach
- Single-shot or Continuous infusion

- May provide longer lasting analgesia with less opiate usage

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Conclusion

- Limited evidence on both:
  - Pain assessment
  - Pain management
- Recommendations:
  - Further research required
    - Most appropriate pain assessment tool
    - Optimum pain management strategy

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Acknowledgments

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Articles Reviewed:

1. McDermott JH, et al. *A case-control study examining inconsistencies in pain management following fractured neck of femur: an inferior analgesia for the cognitively impaired*; Emerg Med J (2014) 31:e2–e8. doi:10.1136/emermed-2013-203007
2. Dewaters T, et al. *Comparison of Self-Reported Pain and the PAINAD Scale in Hospitalized Cognitively Impaired and Intact Older Adults After Hip Fracture Surgery*; Orthopaedic Nursing (2008) 27:21-28.
3. Sieber FE, et al. *Postoperative Opioid Consumption and Its Relationship to Cognitive Function in Older Adults with Hip Fracture*; J Am Geriatr Soc (2011) 59:2256–2262.
4. Candel-Couto JJ, et al. *Pre-operative analgesia for patients with femoral neck fractures using a modified fascia iliaca block technique*; Injury, Int. J. Care Injured (2005) 36: 505—510.
5. Adunskiy A, et al. *Exposure to opioid analgesia in cognitively impaired and delirious elderly hip fracture patients*; Archives of Gerontology and Geriatrics (2002) 35:245–251.

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

Worcestershire NHS
Acute Hospitals NHS Trust

Hip Fractures And Anticoagulation: The Effectiveness Of Warfarin Reversal

Mr Oliver Shastri BSc (Hons) MBBS MRCS
CT1 Trauma & Orthopaedics

Co-authors: Arul Ramasamy, Peter Grice, Christopher Hill, Jonathan Luscombe

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Introduction

- Hip fracture:
  - Commonest cause of injury related death [1]
  - 30% mortality at 12 months [2]
  - Projections estimate >100,000 in 2020 (UK) [3]

➢ Increasingly major public health issue

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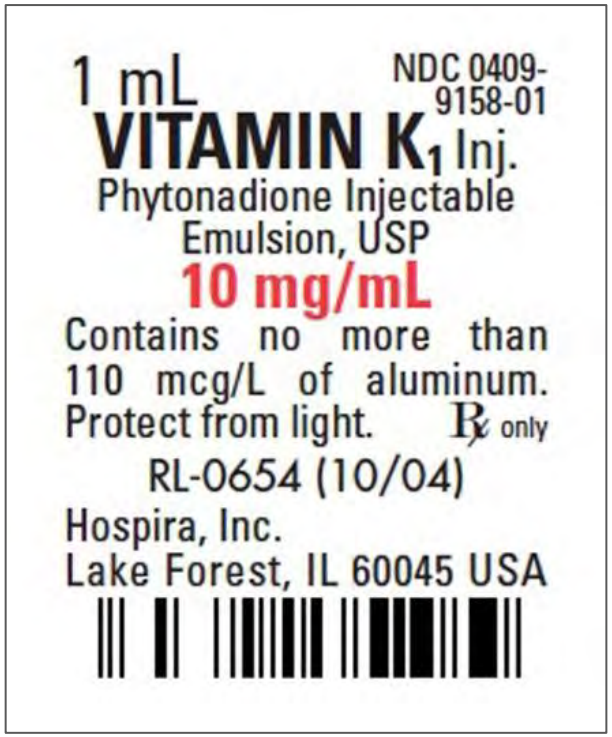
Introduction

- Prompt surgery significantly improves patient outcomes [4,5]
- Delay >48 hours is strongly associated with an increased mortality [6]
- 11% of patients waiting longer than 48 hours because their International Normalised Ratio (INR) is >1.6 due to warfarin [7]

➢ Anticoagulation is a major cause of surgical delay

Introduction

- Vitamin K (phytomenadione) reverses the effects of warfarin [9]
- Early administration of IV vitamin K in warfarinised hip fracture patients ensures early operative management and avoids postoperative complications



Journal of Orthopaedic Surgery 2013;21(2):142-5

Comparison of different warfarin reversal protocols on surgical delay and complication rate in hip fracture patients

Andreas Leonidou, Rishi Rallan, Nancy Cox, Joseph Pagkalos, Jonathan Luscombe
Department of Trauma and Orthopaedics, Alexandra Hospital, Redditch, United Kingdom

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Previous Audit (2011)

- Only 38% received appropriate reversal with Vit K in timely manner
- 64% of patients on warfarin waited >72 hours as a result of non-administration of reversal Rx
- Complication rates significantly higher in non-reversal group vs reversal group (67% vs 11%).

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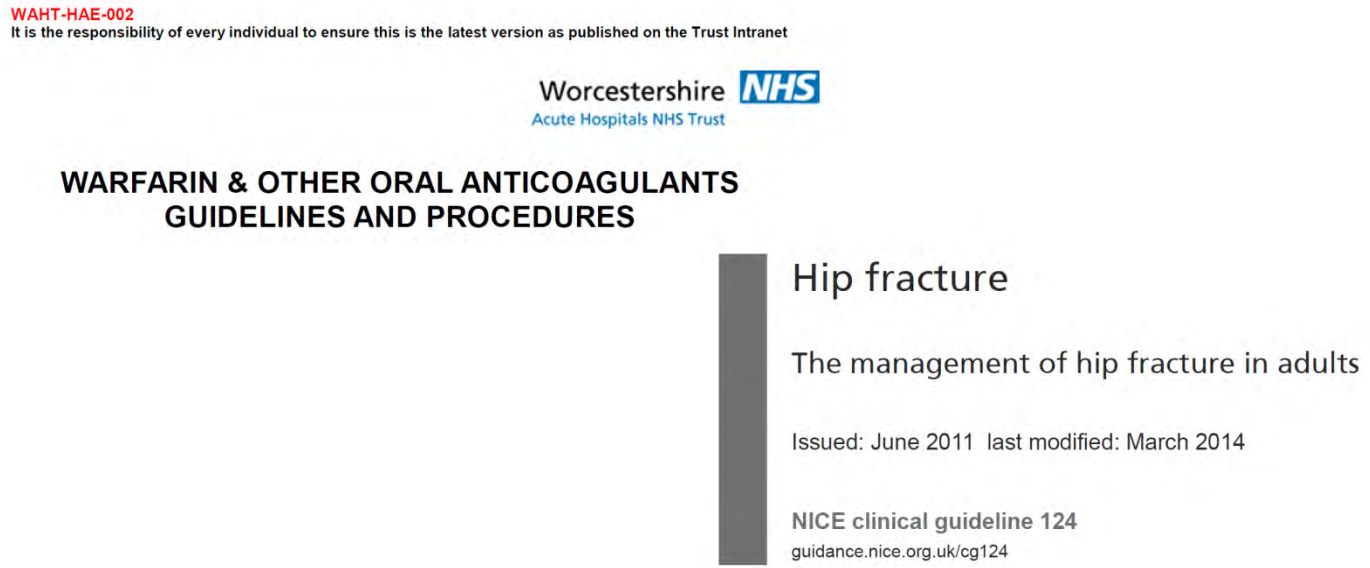
Recommendations

– Early administration of intravenous vitamin K for hip fracture patients on warfarin



WAHT-HAE-002
It is the responsibility of every individual to ensure this is the latest version as published on the Trust Intranet

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WARFARIN & OTHER ORAL ANTICOAGULANTS GUIDELINES AND PROCEDURES

Hip fracture

The management of hip fracture in adults

Issued: June 2011 last modified: March 2014

NICE clinical guideline 124
guidance.nice.org.uk/cg124

Aim

- To re-audit the effectiveness of warfarin reversal in hip fracture patients who are on warfarin anticoagulation

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Audit Standards

1) if INR>1.6, administer 10mg IV Vitamin K (or consider Beriplex)

- Aim for 100% compliance

2) Hip fracture patients should be operated on within 36 hours of admission, in accordance with Best Practice Tariff [11]

- Aim for 90% compliance

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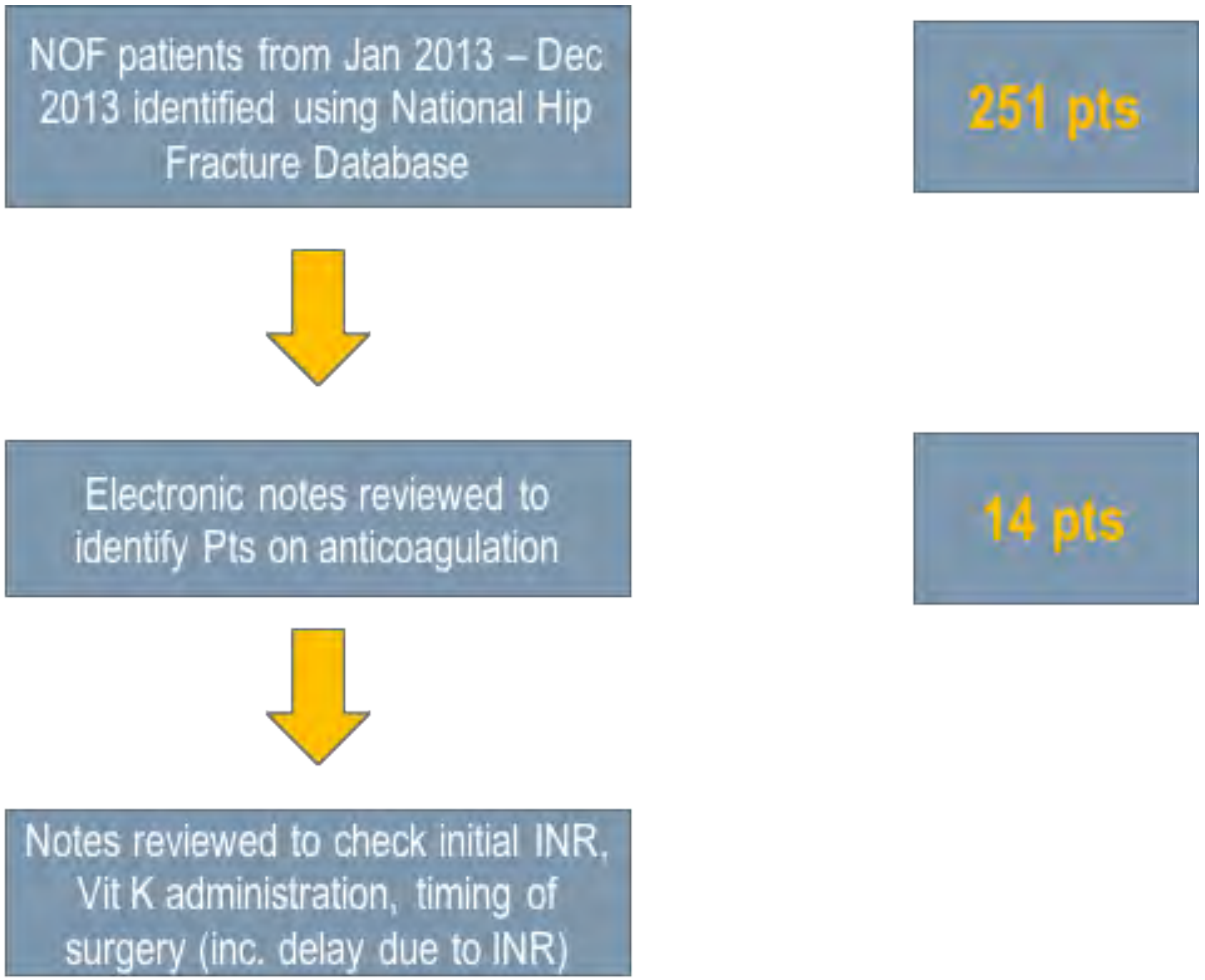
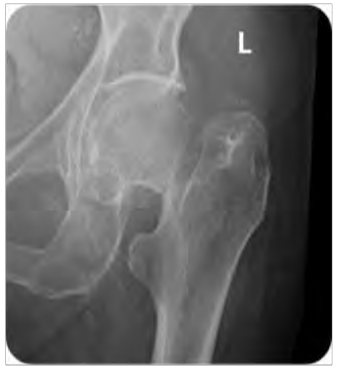
Methodology





#NOF referral? → On warfarin? → INR > 1.6? → **10mg IV Vitamin K**

N.B. following haematology advice

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Results

- No patient had INR<1.6 on admission, mean INR 2.77 (s.d 1.14)
- 90% were correctly reversed using Vitamin K (38% in 2011) and 90% were operated on within 36 hours
- No patient had surgery delayed because INR was not in range
- Average time to theatre from admission was 18hrs (45hrs in 2011)

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Results

	2011	2013
Average time to theatre	45 hrs	18 hrs
Correct warfarin reversal	38%	90%

- Equates to 47 bed days per year (estimated cost £11,408)
- Trust gains £1,335 per patient in Best Practice Tariff rewards part of Department of Health's initiative (>£900,000 in 2013)

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Conclusions

- Improved compliance with reduced time to operation and shortened hospital stay
- The implementation of these guidelines therefore delivers considerable savings whilst saving significantly more lives

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MILAN, ITALY

Is there a role for the periarticular injection in decreasing post operative pain and length of inpatient stay in primary total hip arthroplasty? A systematic review and meta-analysis

Mr Yusuf H Mirza MuDr MRCS Msc

Mr Ashwanth Ramesh MBBS MRCS

Professor Fares S Haddad BSc MCh FRCS (Orth) FRCS Ed

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Disclosure

Senior author receives royalties from

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Institutional Research Support provided by

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- Background
- Research Question
- Methodology
- Results
- Conclusions

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Background

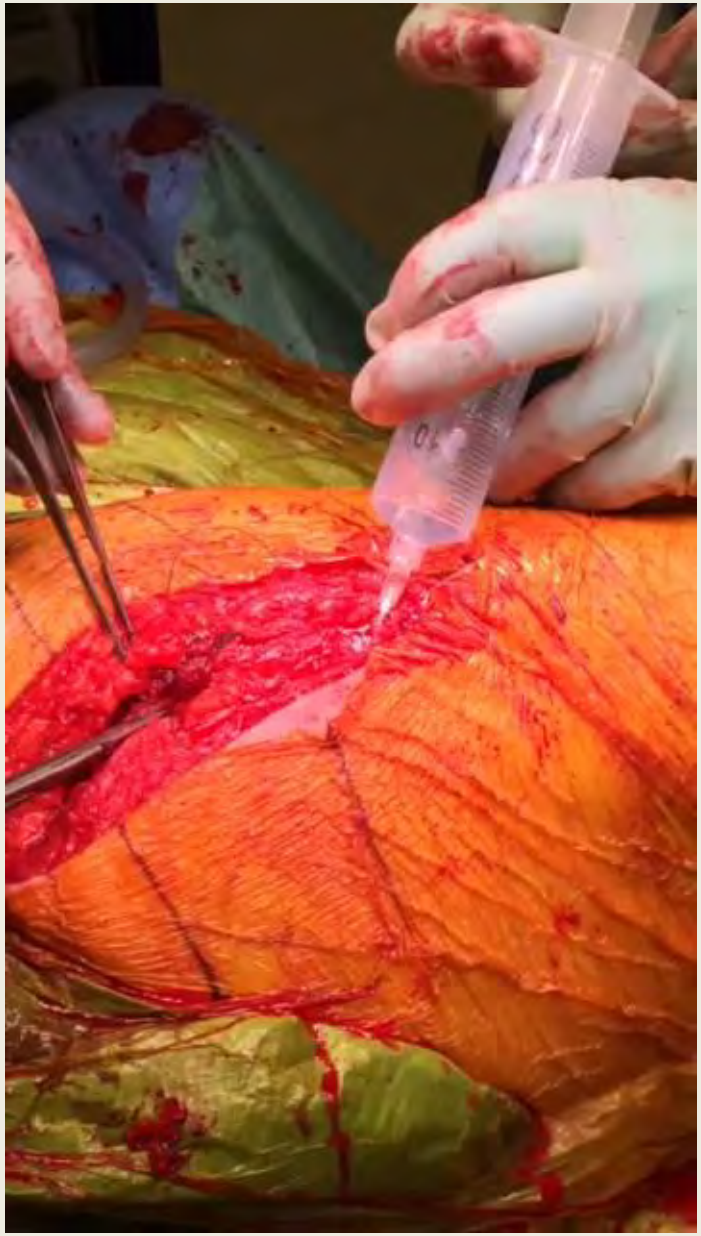
- THA- 2nd most common elective operation in the National Health Service[1]
- The incidence will rise in UK and worldwide[2,3]
- Increased incidence will lead to increased cost
- Length of stay identified as important factor

1. Royal College of Surgeons of England https://www.rcseng.ac.uk/media/media-background-briefings-and-statistics/surgery-and-the-nhs-in-numbers
2. Culliford et al *Future projections of total hip and knee arthroplasty in the UK: results from the UK Clinical Practice Research Datalink*
3 Kurtz *et Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030.*

Background

- Length of inpatient stay associated with ineffective pain relief post operatively.
- Multimodal therapy an attempt to decrease reliance upon opioids
- Periarticular injection forms a cornerstone of multimodal pain relief[4]

4.Kerr et al *Local Infiltration Analgesia; a technique for the control of acute postoperative pain following knee and hip surgery*



Question

Does the periarticular injection decrease post operative pain of the patient and cause a decrease in the length of stay?

Hypothesis

The injection decreases both post operative pain and length of stay

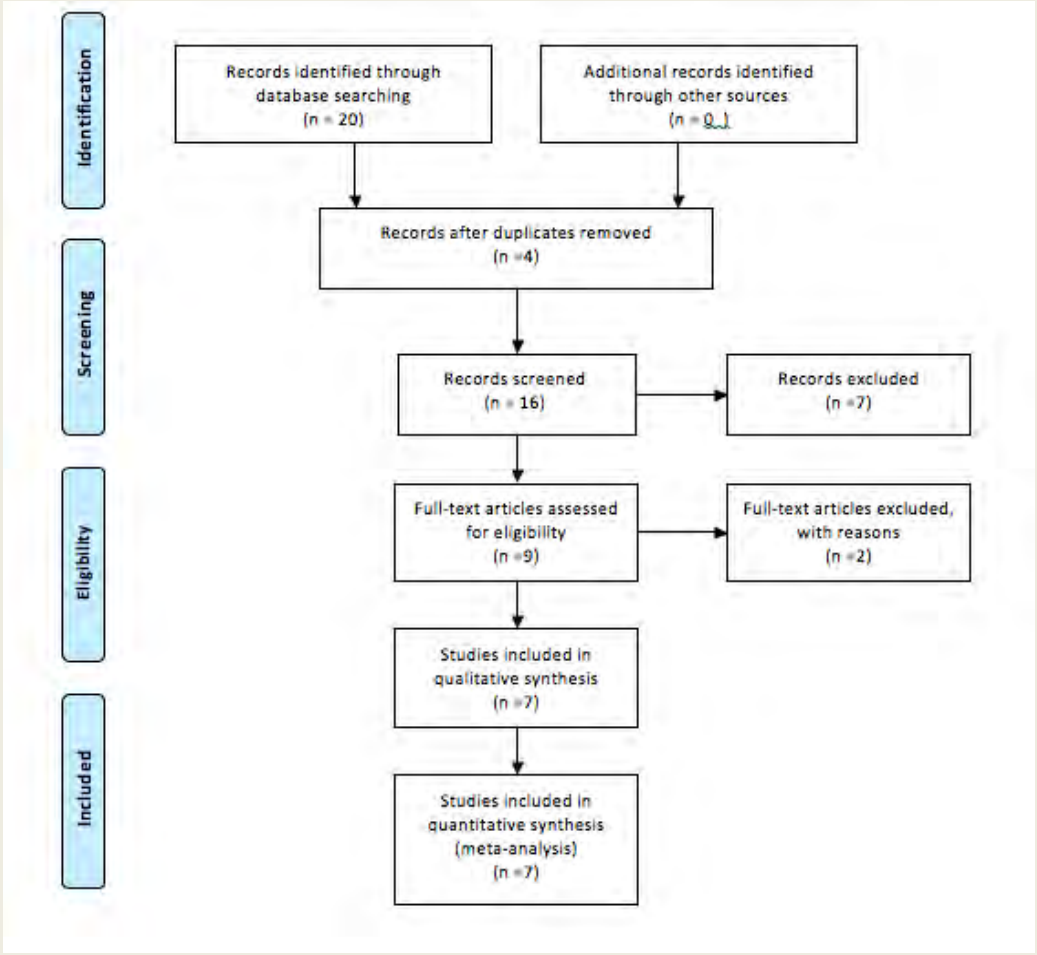
Materials and Methodology

- A systematic review of the literature
- 2 independent reviewers (YM, AR)
- Discrepancy settled by discussion

Materials and Methodology

- Search terms included “total hip arthroplasty”, “total hip replacement”, “periarticular injection”
- *Inclusion criteria*; RCTs, unilateral, primary total hip arthroplasty, periarticular injection
- *Exclusion criteria*; Continuous periarticular injection given via catheter , revision surgery

PRISMA Flow Diagram



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Results

- 7 studies
- n=529 patients
- Male-273; Female-256
- 4 studies; PAI vs no injection
- 2 studies; PAI vs normal saline
- 1 study; PAI vs PCA

Results; Risk of bias table

Author	Random Sequence Generation	Allocation Concealment	Blinding of participants/ personnel	Blinding of outcome assessors	Incomplete outcome assessment	Selective outcome reporting
Busch (2010)	Yes	Unclear	Single blinded	Unclear	No	No
Chen (2014)	Unclear	Yes	Double blind.	Yes, measured by nurse	No	Yes primary outcome remained as per clinicaltrial.gov protocol. But secondary outcomes of WOMAC and SF-36 not reported.
Dobie (2012)	Yes	Yes	Single blinded.	Yes, measured by physio	No	No
Lee (2009)	Not given	unclear	Single blinded.	Yes, patient assessed	No	Unclear
Murphy (2011)	Unclear	unclear	Single blinded	Patient assesse	Not given	Unclear
Nakai (2013)	Not given	Yes	Single blinded, patient	Unclear	No	Yes morphine consumption not reported as the primary
Parvataneni (2007)	Not given	not given	Single blinded	Not given	Unclear, no CONSORT diagram	Unclear

Results; Post operative pain (VAS)

Summary

Continuous Random-Effects Model

Metric: Mean Difference

Model Results

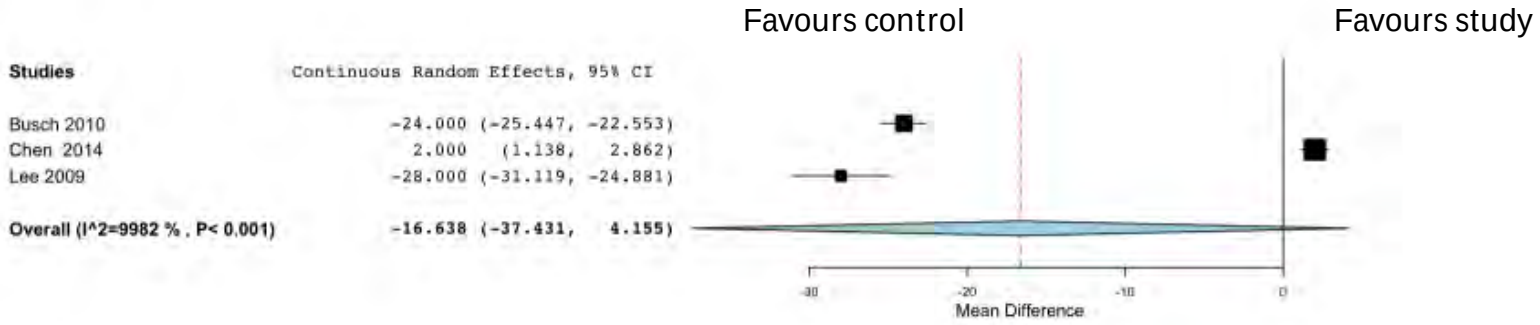
Estimate	Lower bound	Upper bound	Std. error	p-Value
-16.638	-37.431	4.155	10.609	0.117

Heterogeneity

tau^2	Q(df=2)	Het. p-Value	I^2
336.542	1115.978	< 0.001	99.821

p=0.117, Effect size 4.155, I^2=99.8%

Forest Plot



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Results; Length of stay

Summary

Continuous Random-Effects Model

Metric: Mean Difference

Model Results

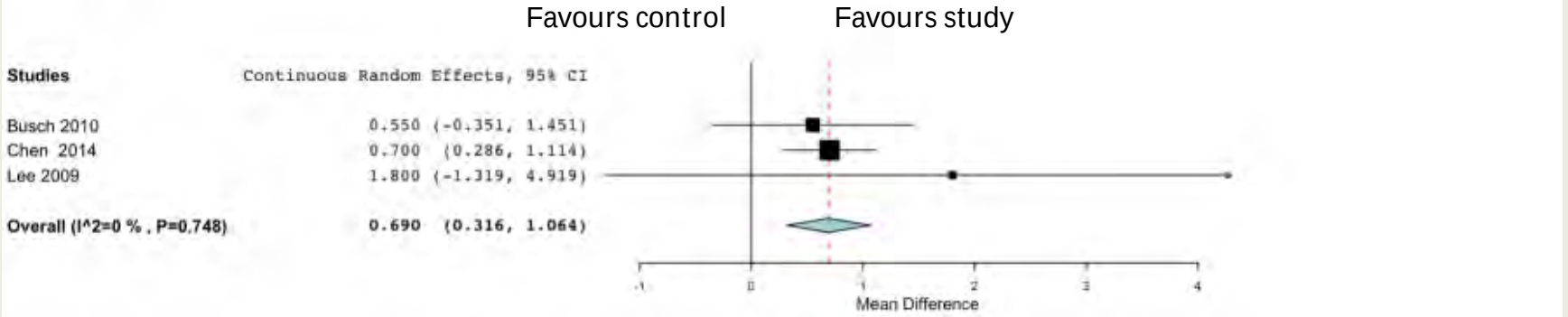
Estimate	Lower bound	Upper bound	Std. error	p-Value
0.690	0.316	1.064	0.191	< 0.001

Heterogeneity

tau^2	Q(df=2)	Het. p-Value	I^2
0.000	0.582	0.748	0

p=<0.001, Effect size 1.0, I^2=0%

Forest Plot



Results; Opioid consumption

Summary

Continuous Random-Effects Model

Metric: Mean Difference

Model Results

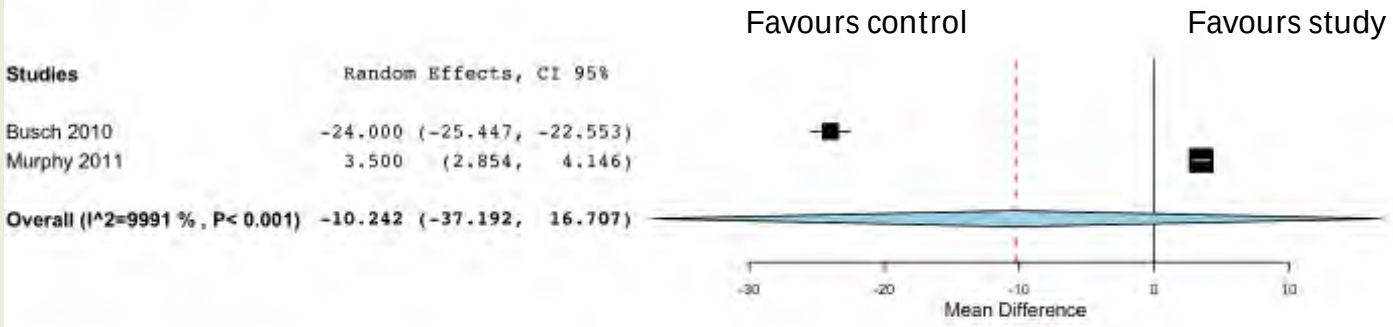
Estimate	Lower bound	Upper bound	Std. error	p-Value
-10.242	-37.192	16.707	13.750	0.456

Heterogeneity

tau^2	Q(df=1)	Het. p-Value	I^2
377.798	1156.408	< 0.001	99.914

p=0.45, Effect size 16.7, I^2=99.9%

Forest Plot



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Conclusions

- The periarticular injection may decrease the length of inpatient stay
- However it does not appear to affect post operative pain in the first 24 hours nor opioid consumption

Conclusions

- Our meta-analysis is limited by the small number of available studies for analysis
- Discrepancies in demographics
- Different combinations of PAI
- Included studies are of questionable validity
- Further well designed studies are necessary to provide a complete answer

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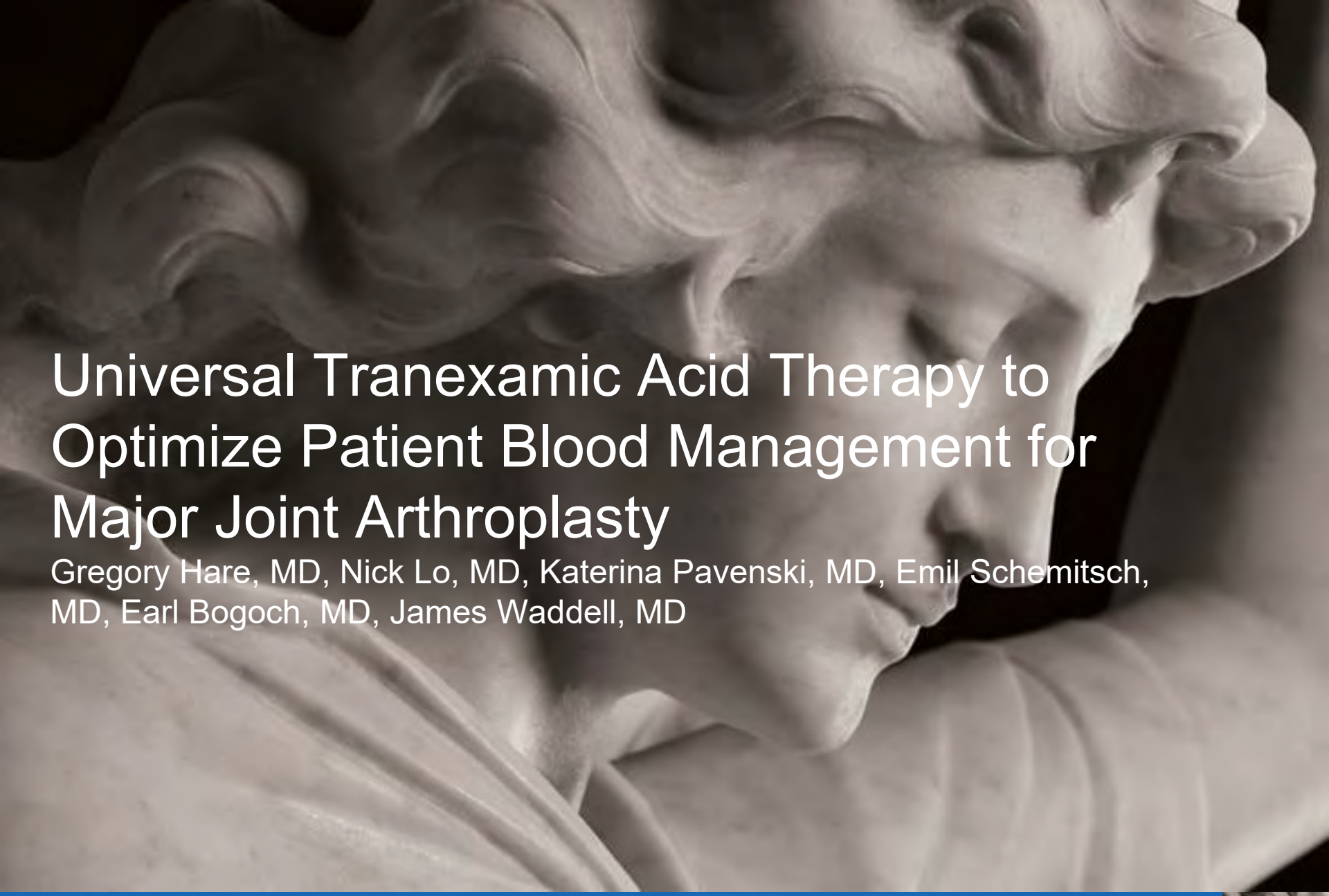


Universal Tranexamic Acid Therapy to Optimize Patient Blood Management for Major Joint Arthroplasty

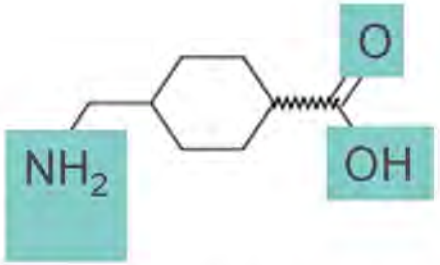
Gregory Hare, MD, Nick Lo, MD, Katerina Pavenski, MD, Emil Schemitsch, MD, Earl Bogoch, MD, James Waddell, MD

St. Michael's

Inspired Care. Inspiring Science.

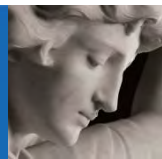
Tranexamic Acid (Cyklokapron)

- Discovered by S. Okamoto- 1980's
- Lysine analogue
- Inhibits the activation of plasminogen to plasmin (active enzyme for clot breakdown)
- FDA Approval Date: December 30, 1986
- Indication: for use "in patients with hemophilia … during and following tooth extraction."
- Canada: "Hereditary angioneurotic edema. Increased local fibrinolysis....as with dental extractions in patients with coagulopathies, epistaxis, hyphema and menorrhagia"
- NOT APPROVED FOR PREVENTION OF SURGICAL BLOOD LOSS

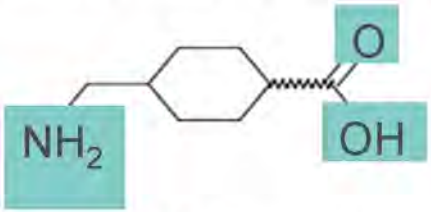


4-(aminomethyl)cyclohexane-1-carboxylic acid

$C_8H_{15}NO_2$



Tranexamic Acid Reduces Blood Loss



Reduced Postpartum Hemorrhage

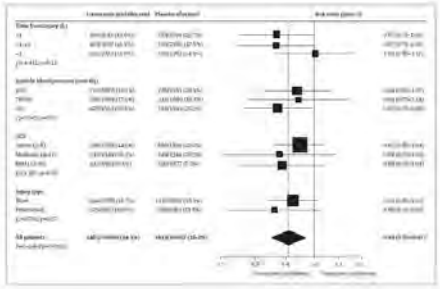
Tranexamic Acid for the Treatment of Postpartum Haemorrhage: an international Randomised, Double Blind, Placebo Controlled Trial

13,279 PATIENTS RANDOMISED

THE COCHRANE COLLABORATION®

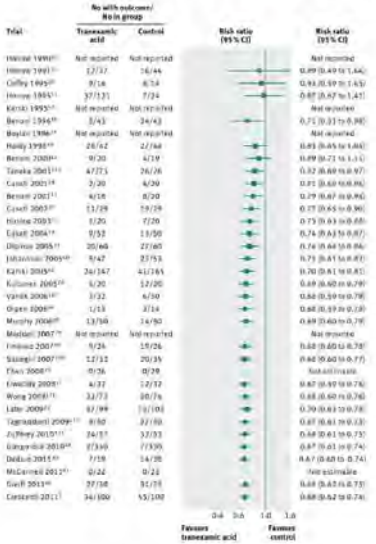
Cochrane Review 2009

Trauma CRASH-II Reduced Death Due To Bleeding

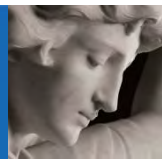


Lancet 2010

Reduced Perioperative RBC Transfusion



BMJ 2011



St. Michael's is a Leader in Research to Assess Drugs which Minimize Intraoperative Bleeding.

Tranexamic Acid Approved for use in Cardiac Surgery at St. Michael's (1992)

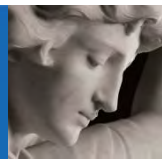
Definitive Trial Demonstrating that Tranexamic Acid is Safe and Effective in Cardiac Surgery (2008)

A Comparison of Aprotinin and Lysine Analogues in High-Risk Cardiac Surgery

BART

Blood Conservation using Antifibrinolytics in a Randomized Trial

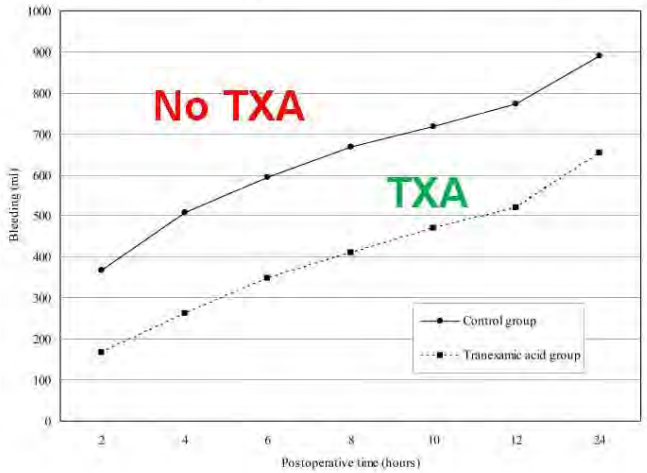
Ferguson DA, Hebert PC, Mazer CD, NEJM 2008



Tranexamic Acid (TXA) in Orthopaedics

Tranexamic Acid Reduces Blood Loss and Red Blood Cell Transfusion after Total Hip Arthroplasty

Post-operative Bleeding

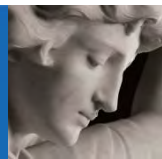


Yamasaki T. et al.
Internat. Orthopaed. 2004.

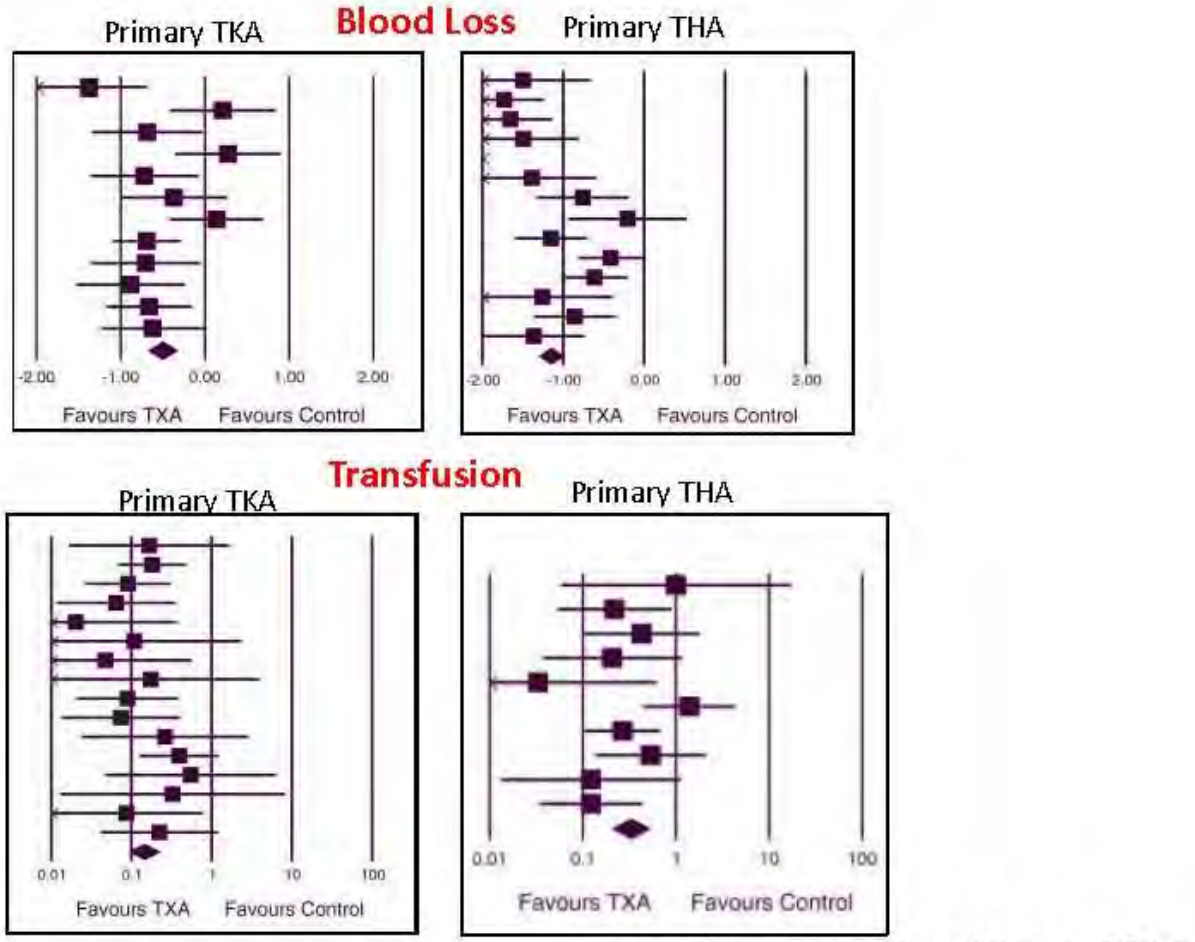
TXA Reduced Blood Loss:
0.97 vs. 1.4 L Blood Loss
($p<0.001$)

TXA Reduced RBC Transfusion:
8/47 (20%) vs. 23/53 (40%)
($p=0.009$)

Johansson P. et al.
Acta Orthopaed 2005.



We Know TXA Reduced Bleeding and Red Blood Cell Transfusion in Orthopaedic Surgery



Gandhi, BMC Res Notes 2013

Tranexamic Acid (TXA) Works-But is it Safe?

thebmj

RESEARCH

Tranexamic acid use and postoperative outcomes in patients undergoing total hip or knee arthroplasty in the United States: retrospective analysis of effectiveness and safety

What is already known on this topic

Tranexamic acid has been shown to reduce perioperative blood loss and blood transfusions in orthopedic surgery

Safety concerns remain, however, as small and highly selective populations were studied

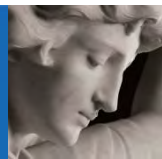
Large scale effectiveness studies are lacking

What this study adds

Tranexamic acid is associated with a decreased risk for blood transfusions, while not increasing the risk of complications, including thromboembolic events and renal failure

Our data provide incremental evidence of the potential effectiveness and safety of tranexamic acid in patients requiring orthopedic surgery

Poeran J et al. BMJ 2014

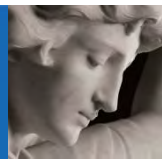


Tranexamic Acid Protocol Established for Hip and Knee Arthroplasty at SMH

TXA-20 mg/KG i.v. Prior to Skin Incision (Hips) or Tourniquet Deflation (Knees)

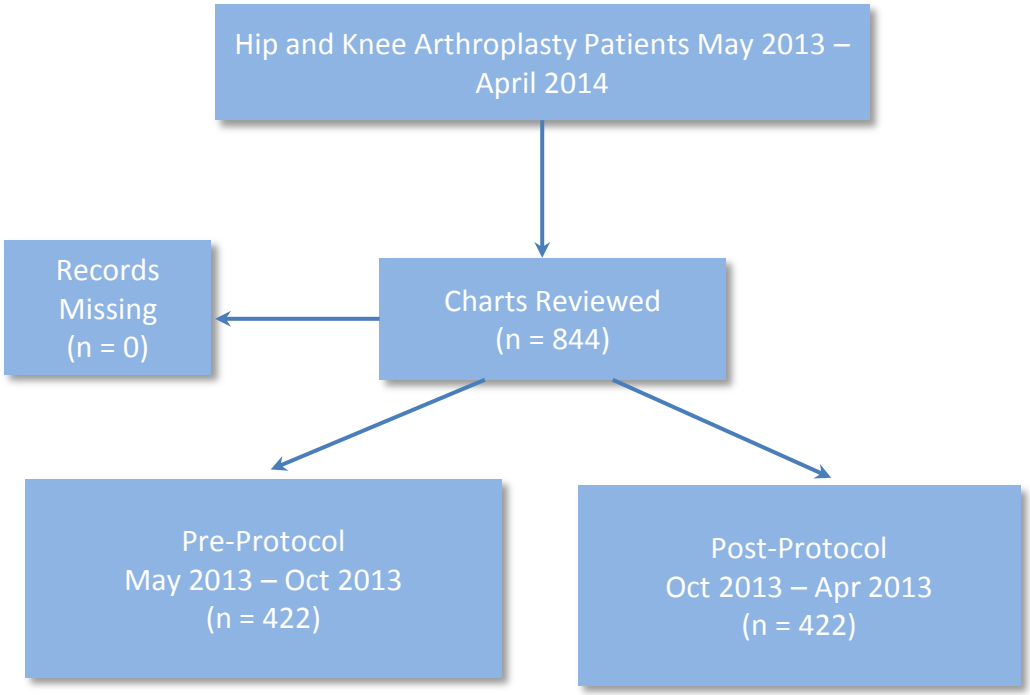
July 16, 2012

Patient Weight Increment (kg)	Tranexamic acid dose (mg)
38 to 42	800
43 to 47	900
48 to 52	1000
53 to 57	1100
58 to 62	1200
63 to 67	1300
68 to 72	1400
73 to 77	1500
78 to 82	1600
83 to 87	1700
88 to 92	1800
93 to 97	1900
98 to 102	2000
103 to 107	2100
108 to 112	2200
113 to 117	2300
118 kg or greater	2400



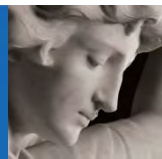
Retrospective Analysis

- After implementation of the protocol for 6 months we performed a retrospective analysis
- We compared patient outcomes (RBC transfusion, perioperative Hb levels, LOS and AEs) in the protocol groups



Patient Demographics, Transfusion Rates, and Mean Hemoglobin Concentration

	Pre-Protocol Group	Post-Protocol Group
Demographics	**N [%]**	**N [%]**
Male	170 [40.3]	182 [43.1]
Female	252 [59.7]	240 [56.9]
Total	422	422
	Mean (SD)	**Mean (SD)**
Age (Years)	65 (12)	63 (13)
Body Mass Index	30.2 (7.4)	30.2 (7.0)
TXA Dose (mg/kg)	19.8 (1.6)	20.0 (1.5)

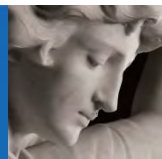


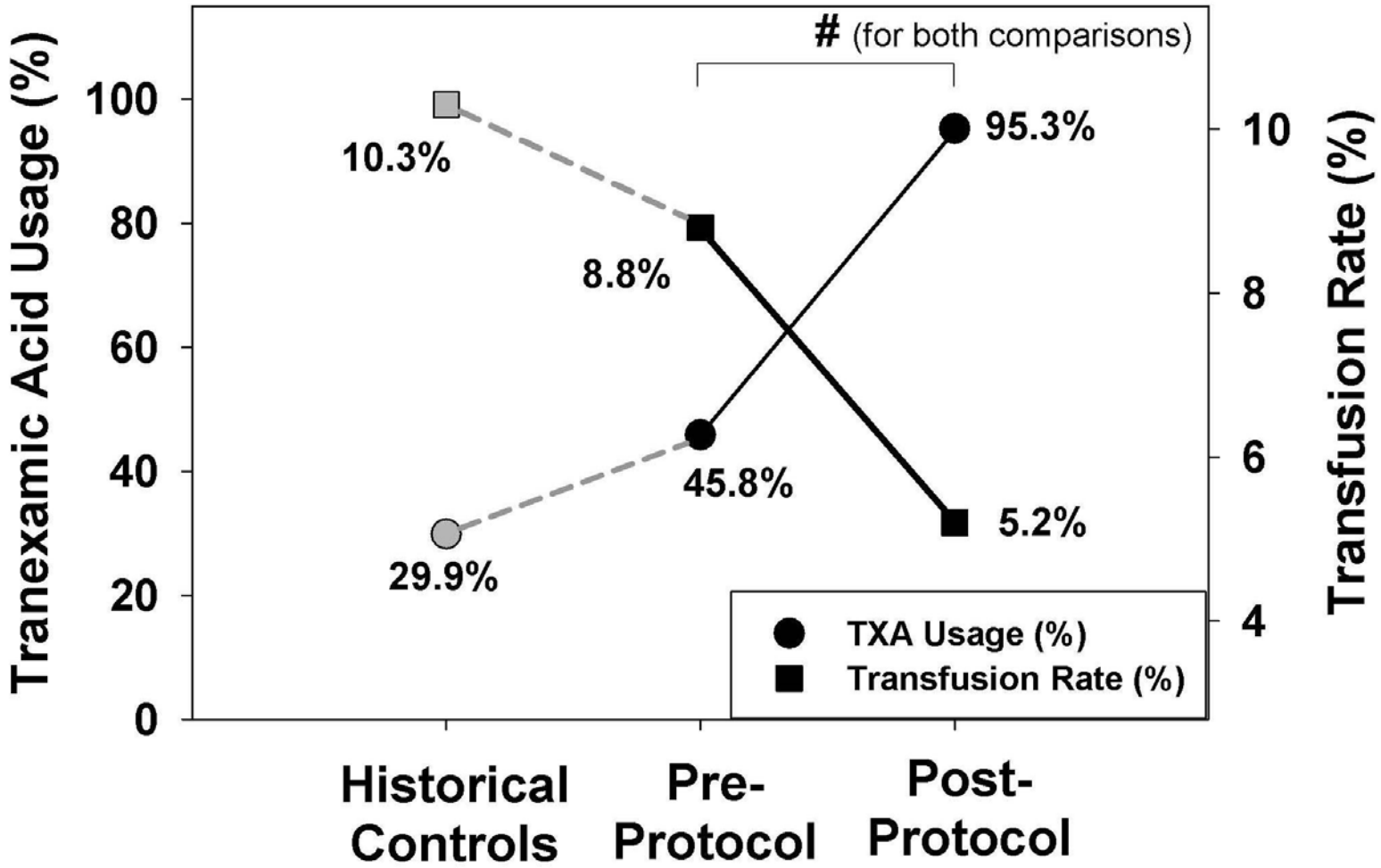
	Pre-Protocol Group			Post-Protocol Group		
Pre-Operative Hemoglobin (g/L)	**N [%]**	**Patients Transfused N [%]**	**Units Transfused**	**N [%]**	**Patients Transfused N [%]**	**Units Transfused**
< 120	63 [14.9]	18 [28.6]	30	43 [10.2]	8 [18.6]	17
120-129	101 [23.9]	6 [5.9]	8	101 [23.9]	7 [6.9]	17
≥ 130	258 [61.1]	13 [5.0]	24	278 [65.9]	7 [2.5]	11
Total	**422**	**37 [8.8]**	**62**	**422**	**22 [5.2]**	**45 #**

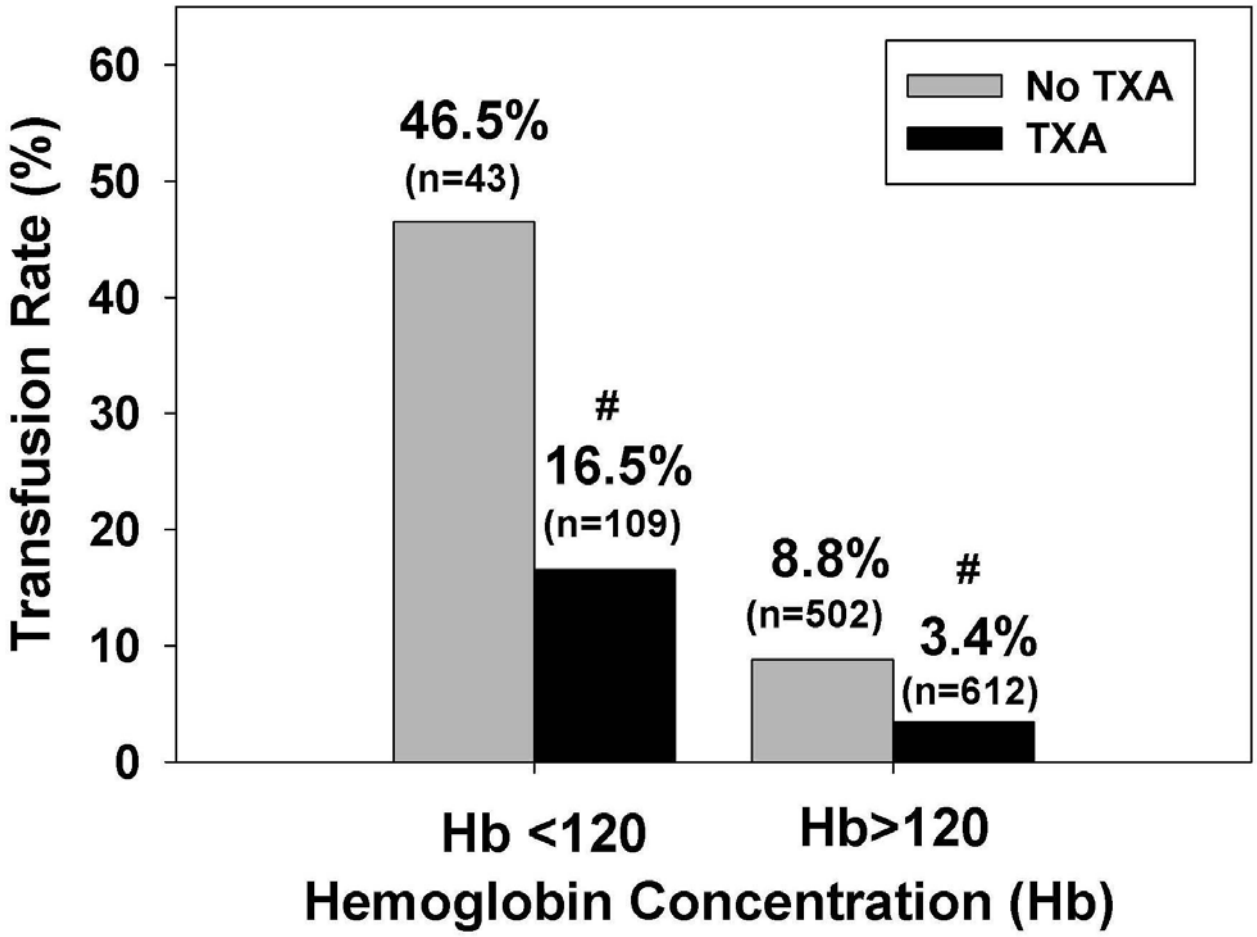
Peri-Operative Hemoglobin (g/L)	**Mean [95% Confidence]**	**Mean [95% Confidence]**
Pre-Op	133 [132– 135] g/L	135 [134 – 136] g/L
Post-Op Day 1	108 [107 – 110] g/L	112 [111 – 113] g/L ##
Post-Op Day 3	97 [96 – 99] g/L	101 [100 – 102] g/L ##
Δ PreOp-PostOp Day 3	36 [35 – 38] g/L	34 [33 – 35] g/L ##

# p<0.001, Chi Square Analysis

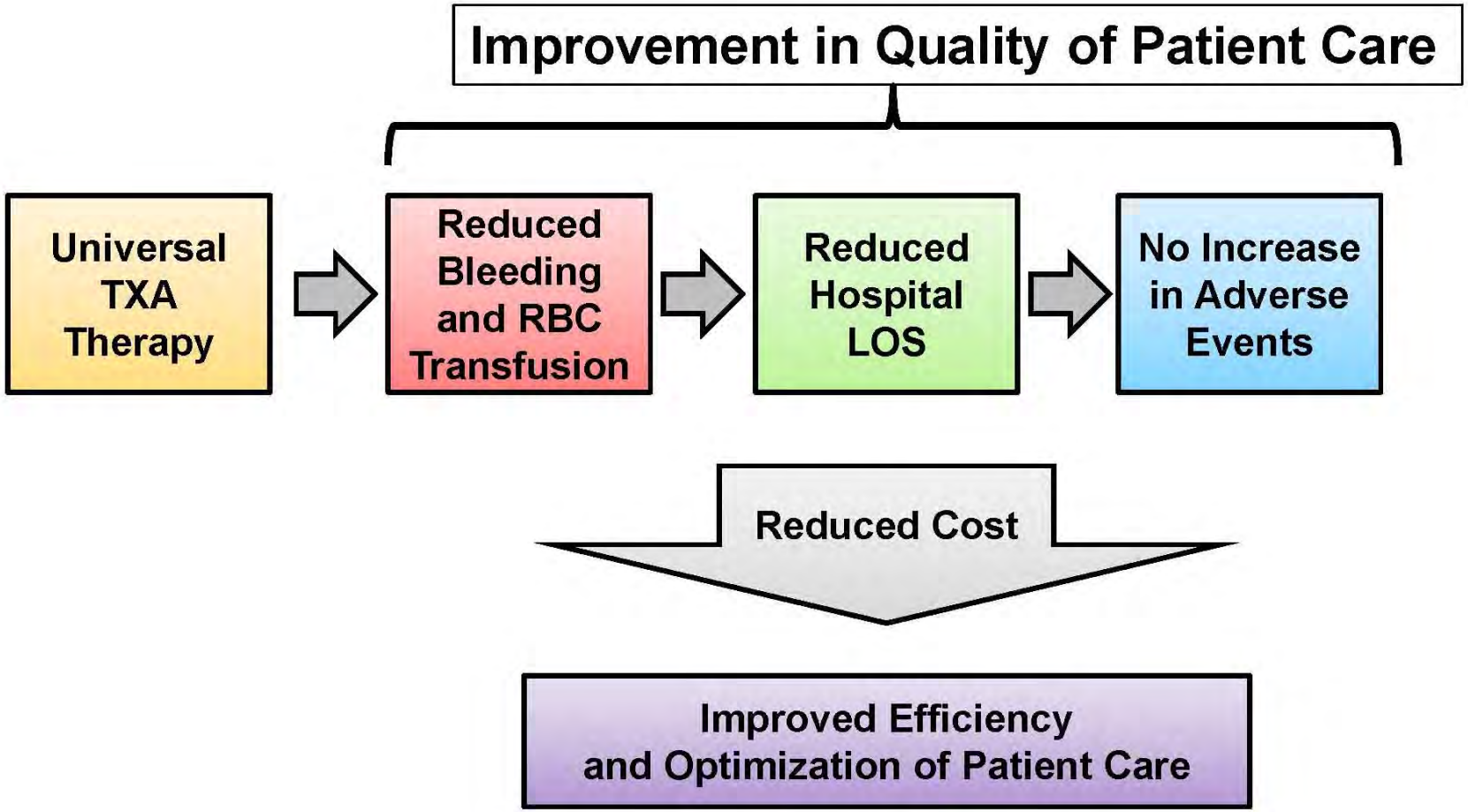
p<0.01, Regression Analysis, relative to pre-protocol group



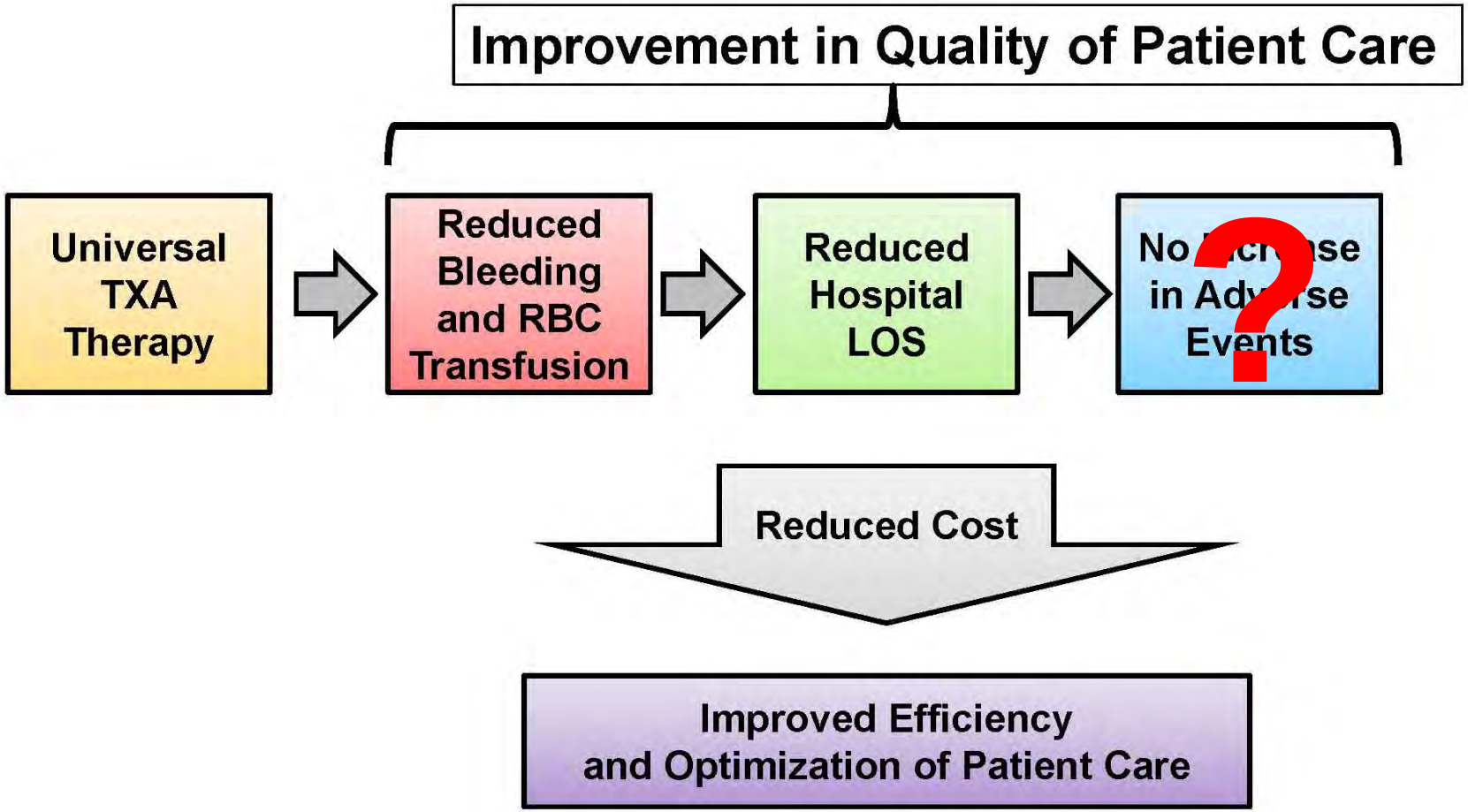

(for both comparisons)
Tranexamic Acid Usage (%)
Transfusion Rate (%)
100
80
60
40
20
0
10
8
6
4
10.3%
8.8%
95.3%
45.8%
5.2%
29.9%
TXA Usage (%)
Transfusion Rate (%)
Historical Controls
Pre-Protocol
Post-Protocol


Transfusion Rate (%)
60
50
40
30
20
10
0
No TXA
TXA
46.5%
(n=43)
#
16.5%
(n=109)
8.8%
(n=502)
#
3.4%
(n=612)
Hb <120
Hb>120
Hemoglobin Concentration (Hb)

Translation in Action to Improve Quality of Patient Care

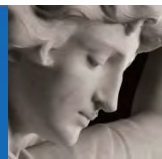


Translation in Action to Improve Quality of Patient Care



Utilizing TXA Did NOT Increase the incidence of Severe Adverse Events or Thrombosis

	Death	MI	Stroke	DVT	PE	Acute Kidney Injury	Seizure
No-TXA (18)	**3** (0.2%)	**5** (0.4%)	**0** (0.0%)	**1** (0.1%)	**5** (0.4%)	**3** (0.2%)	**1** (0.1%)
TXA (13)	**0** (0.0%)	**2** (0.2%)	**1** (0.1%)	**1** (0.1%)	**5** (0.6%)	**4** (0.4%)	**0** (0.0%)



Cost Analysis-Impact for <$10 per Patient

Cost of TXA ($10,000)

Cost of TXA	$28.57/5g	$12.08/1g
Cost per gram for 3:1 use	$6.11	
Average dose	1.604	
Cost per patient treated	$9.80	
Estimated # Patients	1073	
% treated	95.30%	
Total patients treated	1023	
Total cost	$10,019.12	

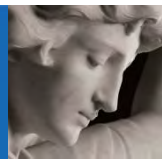
Estimated Cost Savings

42 fewer RBC transfusions
32 fewer patients transfused
96 Hospital days saved

42 x $1000 = $ 42,000
96 x $2000 = $192,000

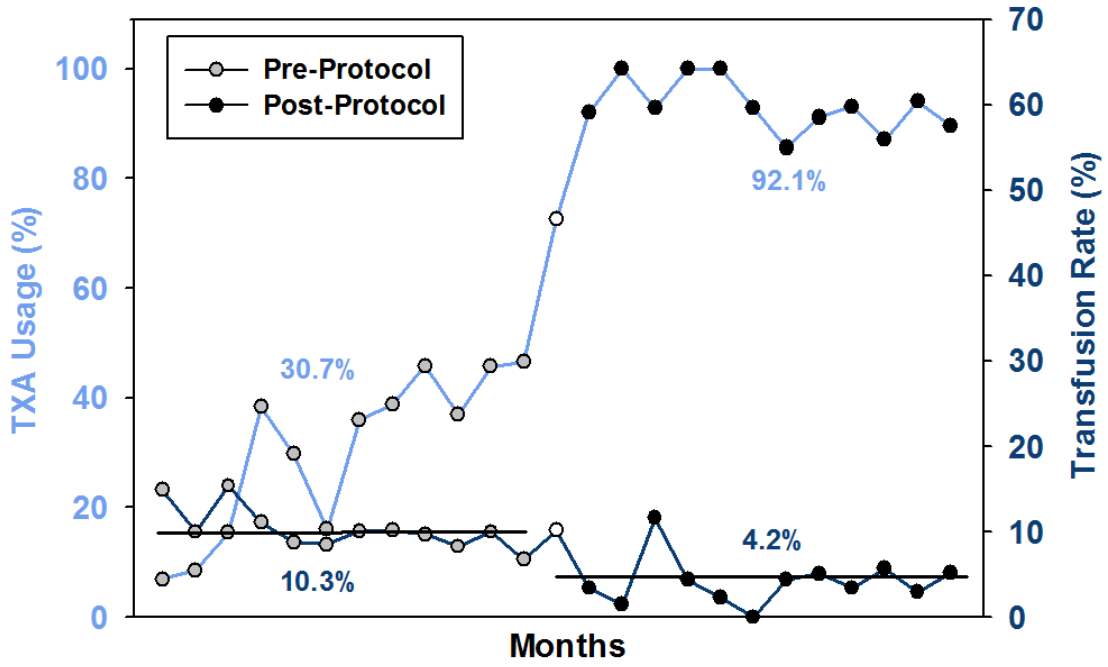
TOTAL= $234,000

Cost Reduction
Cost Re-Assignment ~$225,000
Cost Efficiency

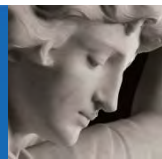


TXA Reduces the RBC Transfusion Rate: Phase II

- We are still using the TXA protocol, and we continue to collect and analyze data
- There has been a sustained reduction in RBC transfusions



Thank You



INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

INTERNATIONAL COMBINED MEETING
BRITISH HIP SOCIETY SOCIETÀ ITALIANA DELL'ANCA
26-27 NOVEMBER 2015 MILAN, ITALY

"Local use of tranexamic acid in patients undergoing hip or knee arthroplasty to minimize the blood loss"

Mohamed Mahran, MD
Arthroplasty Unit
Assiut University Hospitals
Assiut, Egypt

Co Authors:

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  - Chef of Arthroplasty Unit
  - Assiut University Hospitals
  - Assiut, Egypt

- **Hatem Bakr, MD**
  - Arthoplasty Unit
  - Assiut University Hospitals
  - Assiut, Egypt

Background:

- Many studies have suggested that topical tranexamic acid (TXA), an antifibrinolytic agent, is safe and effective in reducing postoperative bleeding in orthopedic procedures.

- This issue is very important in patients receiving total knee (TKA) or total hip arthroplasty (THA) as they are transfused at high rates (11- 37%)

- Krohn CD, Sorensen R, Lange JE, Riise R, Bjornsen S, Brosstad F. Tranexamic acid given into the wound reduces postoperative blood loss by half in major orthopaedic surgery. Eur J Surg Suppl. Jul. 2003 (588):57–61.
- Wong J, Abrishami A, El Beheiry H, et al. Topical application of tranexamic acid reducespostoperative blood loss in total knee arthroplasty: a randomized, controlled trial. J Bone Joint SurgAm. Nov 3; 2010 92(15):2503–2513.
- Bierbaum BE, Callaghan JJ, Galante JO, Rubash HE, Tooms RE, Welch RB. An analysis of blood management in patients having a total hip or knee arthroplasty. J Bone Joint Surg Am. Jan; 1999 81(1):2–10.

Objectives:

- To investigate the efficacy and safety of local tranexamic acid in patients receiving either total knee or total hip arthroplasty.

Methods:

- Arthroplasty Unit, Assiut University Hospitals
- Same team of surgeons
- March 2013
- Double Blind study
- 144 patients
  - 81 TKA
  - 63 THA

Methods:

- Exclusion Criteria:
  - History of blood disease
  - Allergy to TXA

- Two groups
- (A) Receiving TXA
- (B) Receiving saline as placebo

Methods:

- Patients demographic data were collected preoperative
- Preoperative Hgb as well as immediate, 24 & 48 hrs postoperative Hgb were recorded
- Amount of postoperative bleeding in the drain was recorded
- The need for blood transfusion was recorded

Methods:

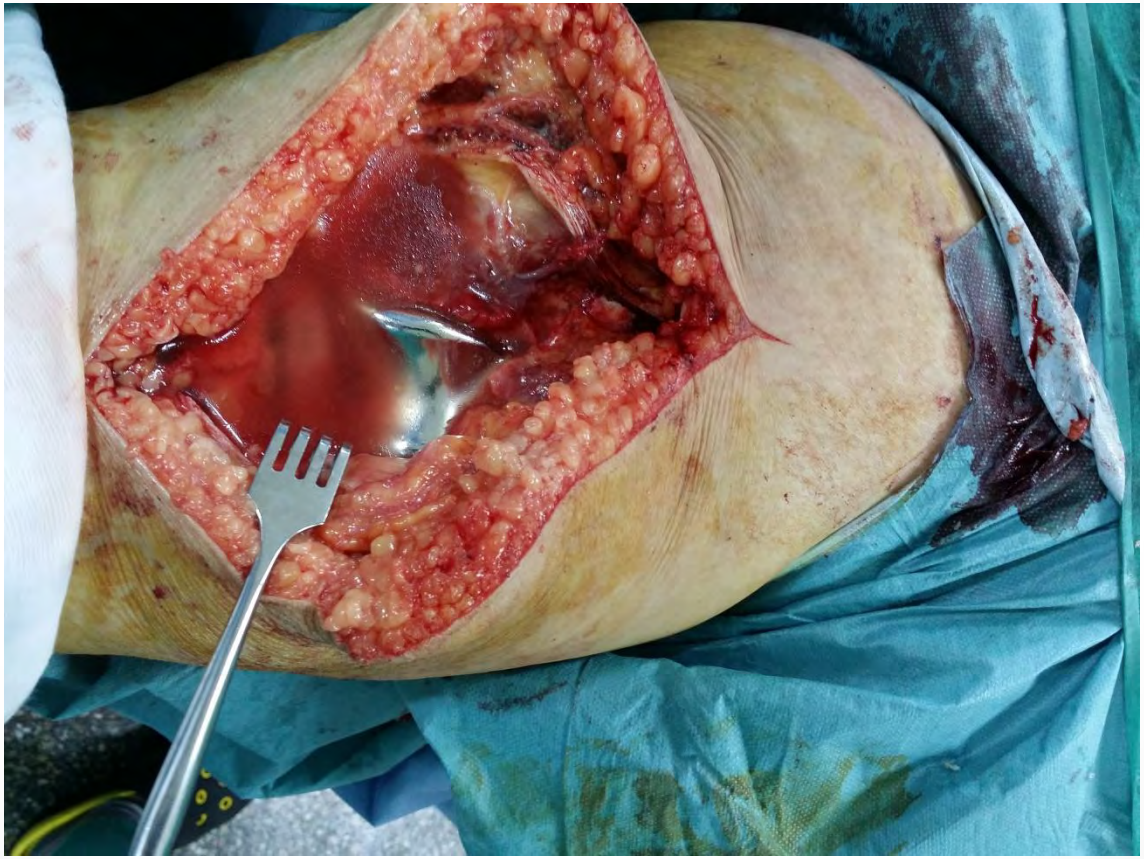
- All operations under spinal anaesthesia
- Lateral (Modified Hardinge) approach was used in all hip patients
- Medial parapatellar approach was used in all knee patients

Methods:

- A solution of 3gm TXA added to 100 ml saline was added into the surgical wound after the final implantation of the prosthesis
- It was left there for 3 minutes and then closure starts in anatomical layers with suction drain insertion, the drain was kept closed for one hour then opened.
- All the drains were removed after 24 hours

- Wong J, Abrishami A, El Beheiry H, et al. Topical application of tranexamic acid reduces postoperative blood loss in total knee arthroplasty: a randomized, controlled trial. J Bone Joint Surg Am. Nov 3; 2010 92(15):2503–2513

Methods:



Methods:

- Blood volume in the drain was recorded
- Hgb was recorded immediately, at 24 and at 48 hrs postoperative
- Total blood units needed for transfusion postoperative were recorded

Methods:

- **Calculation of the blood loss.**

- Blood loss was calculated using equations described by Good et al. and Nadler et al.

- Good L, Peterson E, Lisander B. Tranexamic acid decreases external blood loss but not hidden blood loss in total knee replacement. Br J Anaesth. May; 2003 90(5):596–599.
- Nadler SB, Hidalgo JU, Bloch T. Prediction of blood volume in normal human adults. Surgery 1962;51:224-32. 4.

Methods:

- **Blood loss (in mL) = 100mL/dL × Hgb loss/Hgbi**
- **Hgb loss = BV × (Hgbi – Hgbe) × 10dL/L + Hgbt**

- BV = Estimated total body blood volume in liters
  = $0.3669 \times H^3 + 0.03219 \times W + 0.6041$ (for men),
  = $0.3561 \times H^3 + 0.03308 \times W + 0.1833$ (for women)
- H = Height in meters
- W = Body mass in kg
- Hgbi = Hgb concentration prior to surgery (g/dL)
- Hgbe = Least Hgb concentration postoperative(g/dL)
- Hgbt = Total amount of allogeneic Hgb transfused (g).

Results:

- From March 2013 till August 2015, 144 patients were enrolled in this study undergoing either TKA or THA
- 81 TKA
  - 53 in group (A)
  - 28 in group (B)
- 63 THA
  - 29 in group (A)
  - 34 in group (B)

Results:

- There were no statistical significant differences:
  - age
  - body mass index (BMI),
  - preoperative hemoglobin levels

Results:

TKA

	Group (A)n=53	Group (B)n=28	P Value
Age	64.14±8.92	61.60±9.40	P=0.725n.s
BMI	30.22±3.22	32.35±2.33	P=0.382n.s
Preop. Hgb	12.83±1.36	12.56± 1.56	P=0.522n.s

Results:

THA

	Group (A) n=29	Group (B) n=34	P Value
Age	58.2±7	56.60±9.2	P=0.63n.s
BMI	31.6±3.1	32.7±3.2	P=0.32n.s
Preop. Hgb	12.2±2	11.3± 1.6	P=0.58n.s

Results:

- There were statistical significant differences:
  - Lowest postop. Hgb
  - Blood Loss
  - Need for blood transfusion

Results:

TKA

	Group (A)n=53	Group (B)n=28	P Value
Postop. Hgb	12.14±0.65	9.05±0.93	P< 0.001
Blood Loss	673.32±27.65	1114.00±29.65	P< 0.001
Blood Transfusion	1.8% (1)	10.7% (3)	P< 0.001

Results:

THA

	Group (A)n=29	Group (B)n=34	P Value
Postop. Hgb	11.4±0.53	9.13±1.23	P< 0.001
Blood Loss	273.2±54.15	670.01±65.2	P< 0.001
Blood Transfusion	0%	17.6% (6)	P< 0.001

Conclusion:

- According to our study the use of topical TXA will significantly reduce the blood loss after TKA and THA thus reducing the need for blood transfusion avoiding its complications.

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

TOPICAL USE OF HIGH DOSE TRANEXAMIC ACID IN THR

A Prospective Double Blind Randomised control Trial

Dr WIM VANDESANDE
AZ ST DIMPNA GEEL
BELGIUM

SET UP

A Prospective Double Blind Randomised control Trial

*61 PATIENTS:

TREATMENT GROUP tranexamic acid : 24 Patients, avg age 70,18f/7m

CONTROL GROUP Placebo : 37 Patients, avg age 64, 18f/19m

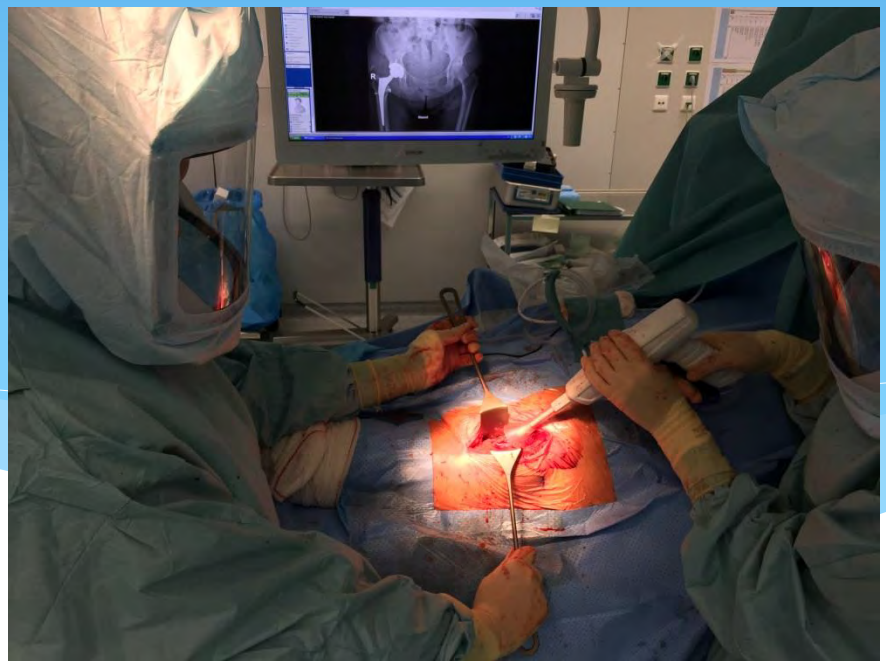
*3 Surgeons

*3 approaches: Ant lat/post/DAA

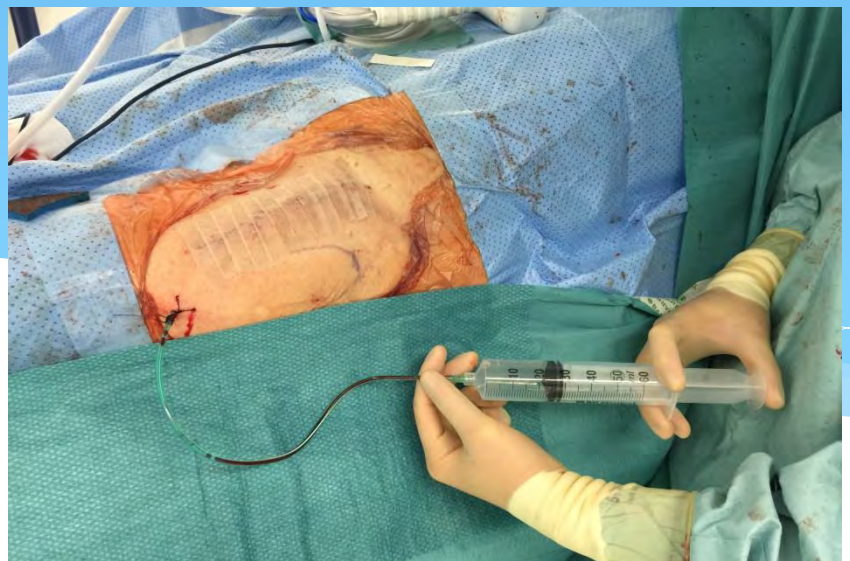
* 2 implant pairs: Ogee+Exeter/ Pinnacle+Corail

- *51 DJD/ 6 avn/ 4 fracture

1. IRRIGATION FLUID: (2,5g/3l saline solution (0,9%))



2. INJECTION THROUGH THE DRAIN IN THE WOUND AFTER CLOSURE: (2,5g = 5 ampullae)



RESULTS: TRANSFUSION RATE

4/24 transfusions in the Transexamic Acid group:17 %

- 14/37 tranfusions in the control group: 38%
- (p=0,04)

- **THIS is a 55 % reduction in transfusion rate!**

RESULTS: DRAIN VOLUME

Day 0

Control Group: 140 ml
TA Group : 82,2 ml

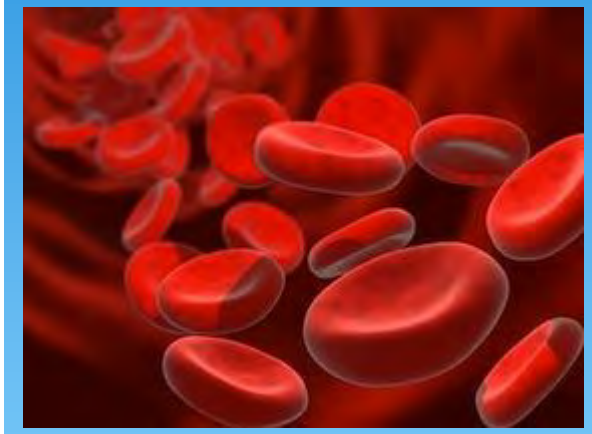
This is a 42 % reduction (P:0,02)

Day1

Control Group : 277,6 ml
TA Group : 140,0 ml

This is a 50% reduction (P:0,03)

RESULTS: HEMOGLOBINE DROP



Mean HB drop D0 Control: 13,5% vs TA: 11,3% (p=n.s.)

Mean HB drop D1 Control: 23,3% vs TA: 18,4% (p=n.s.)

Mean HB drop D5 Control : 33,4% vs TA: 22,8% (p=0,059)

33 procent reduction in HB drop in 5 days!

COMPLICATIONS

- 1 DVT after 2 months (control group)
- 1 low grade Infection (TA group)

- No statistical significant difference between groups

DISCUSSION

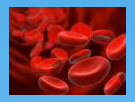
- **Study strongpoints:**
  - prospective
  - double blind
  - randomised

- **Study downsides**
  - 3 surgeons
  - 3 approaches
  - 2 implant pairs
- Low number of included patients

CONCLUSIONS

- TOPICAL USE OF TRANEXAMIC ACID in THR IS SUPERIOR TO PLACEBO

- **55%** REDUCTION IN TRANSFUSION RATE



- **33%** REDUCTION IN POSTOP HEMOGLOBINE DROP AFTER 5 DAYS

- **50%** REDUCTION IN DRAIN VOLUME AFTER 1 DAY

- NO INCREASED VENOUS THROMBOEMBOLIC EVENTS OR INFECTIONS

INTERNATIONAL COMBINED MEETING

BRITISH HIP SOCIETY
SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

A novel approach to control pain following total hip replacement (THR)

Mohammad Salhab

David Macdonald

Peter Kimpson

Jonathan Freeman

Todd Stewart

Martin Stone

Chapel Allerton Hospital Orthopaedic Centre , Leeds, England.

Leeds Musculoskeletal Biomedical Research Unit

Pain following THR

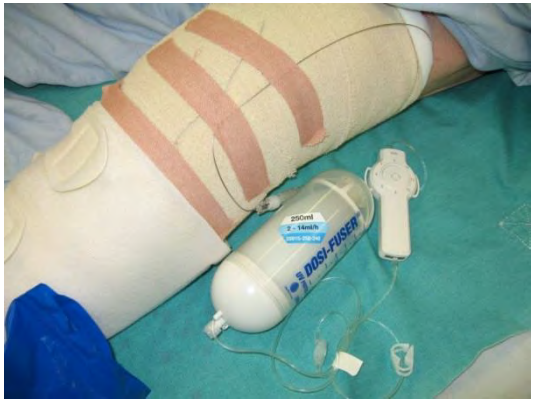
- Moderate to severe pain up to 70 %.
- >70,000 THR/year in UK and > 60,000 in Italy.
- Culture of opiate usage.
- “Rebound Pain” **An increase in acute pain that is encountered during the first few hours after the effects of regional anaesthesia or LA resolve.**

Study Design and Aims

- 173 elective primary THRs. 3 surgeons.
- 5 cohorts over 2 years.
- All Posterior except GA group = lateral.
- Aims to study **opiate usage** as main primary outcome over **48 hours period**.

Groups and methods

1. GA only 31 pts
2. SA only 37 pts
3. SA + LA (marcaine) 34 pts
4. SA + LIA (*Ropivicaine+adrenaline+ketolorac)* 38 pts
5. SA + LIA + PainKwell pump system 33 pts



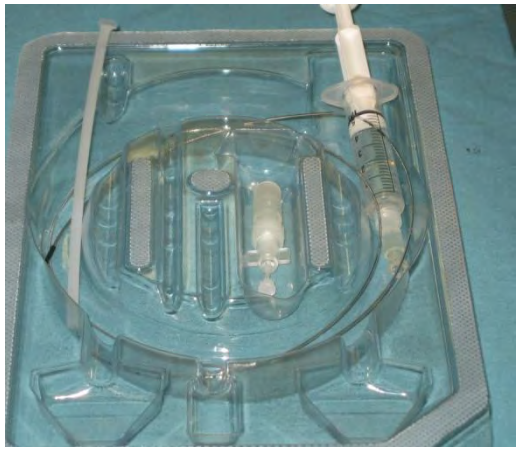
PainKwell Pump System

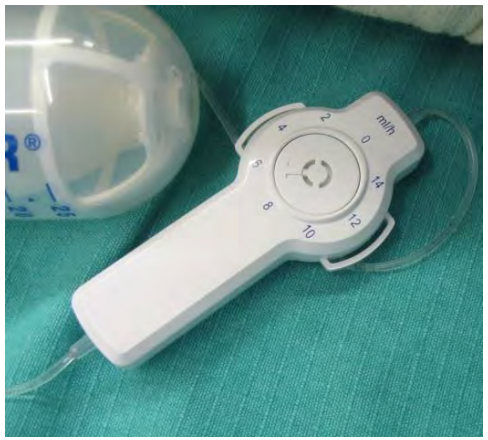
1. Catheter + Introducer

48 hours

2. Regulator

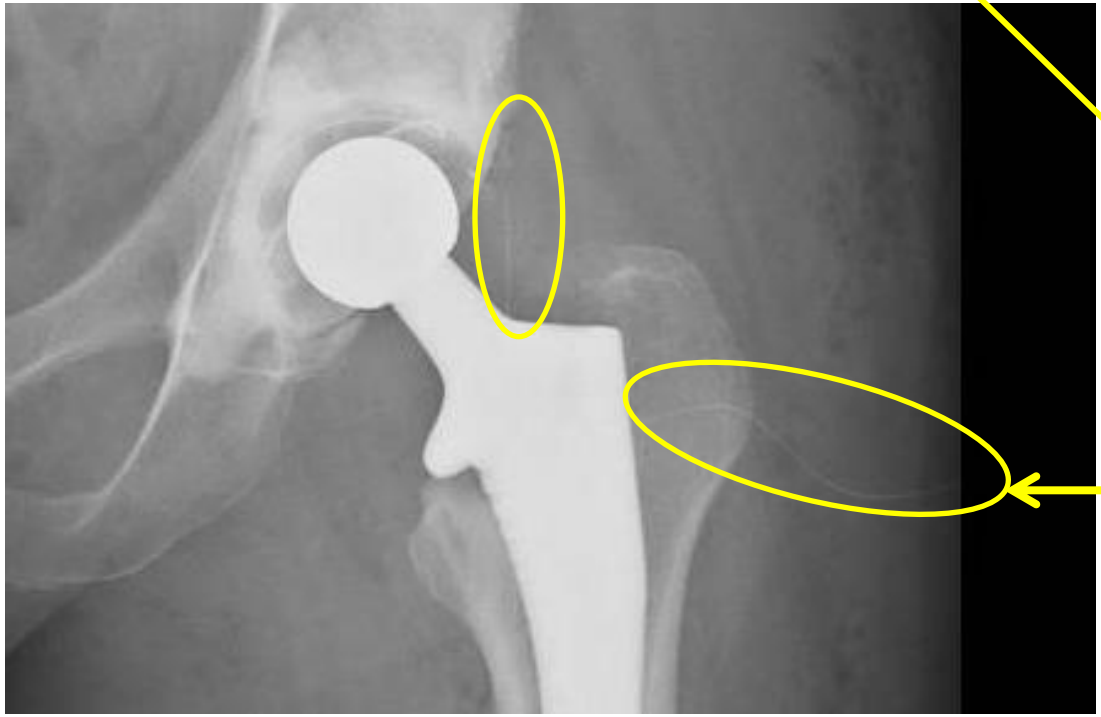
3. Pump

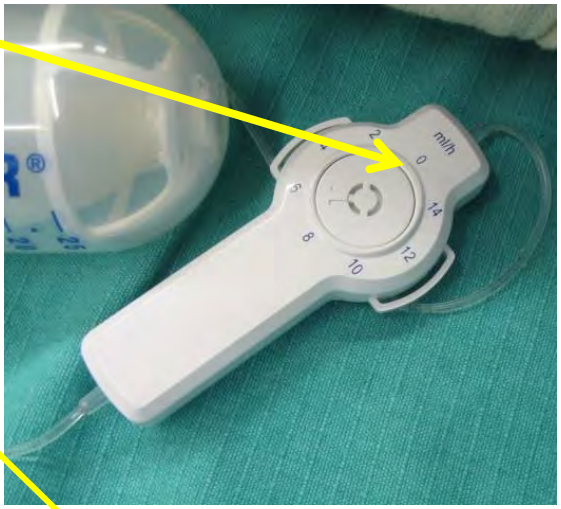


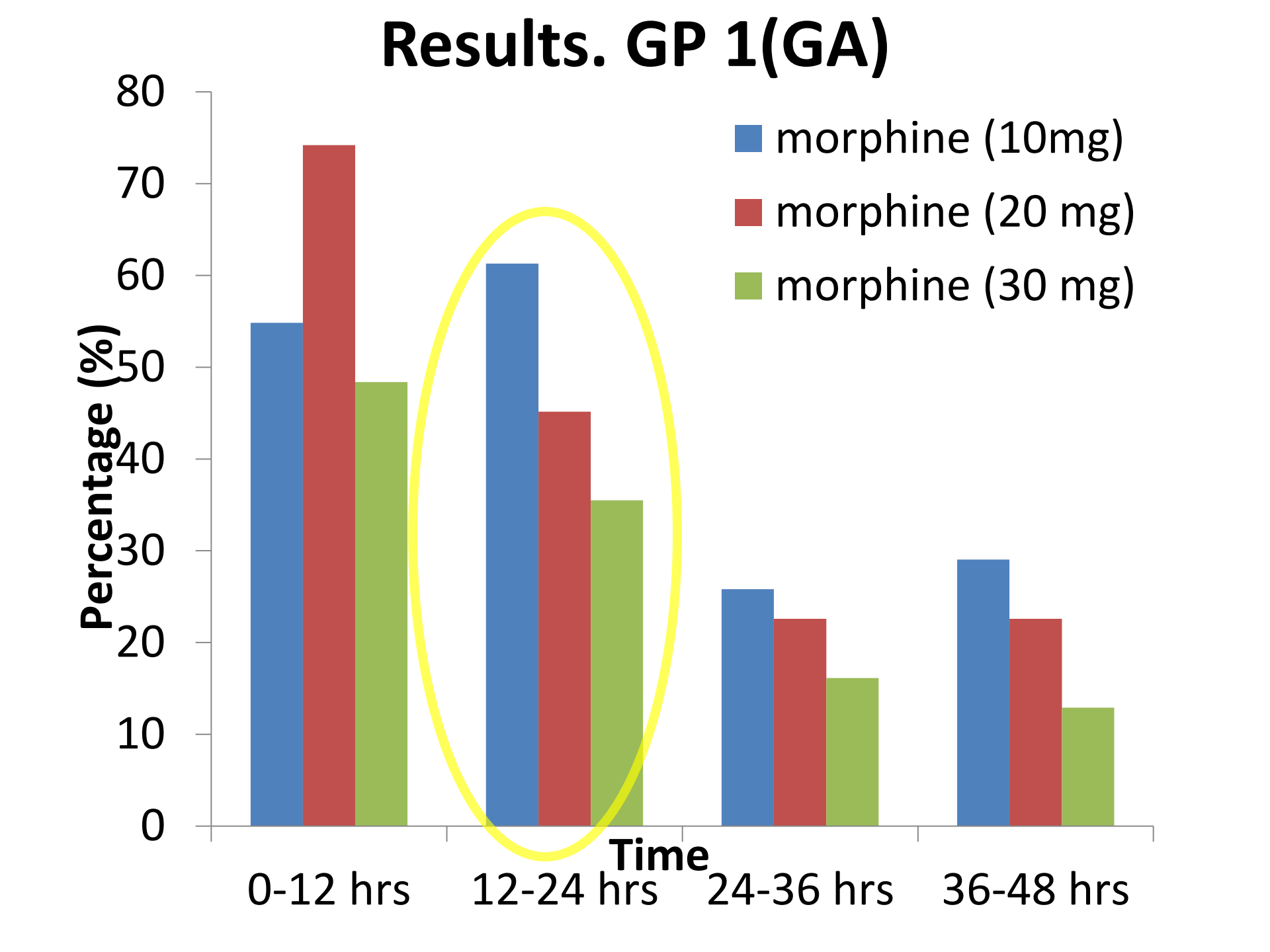


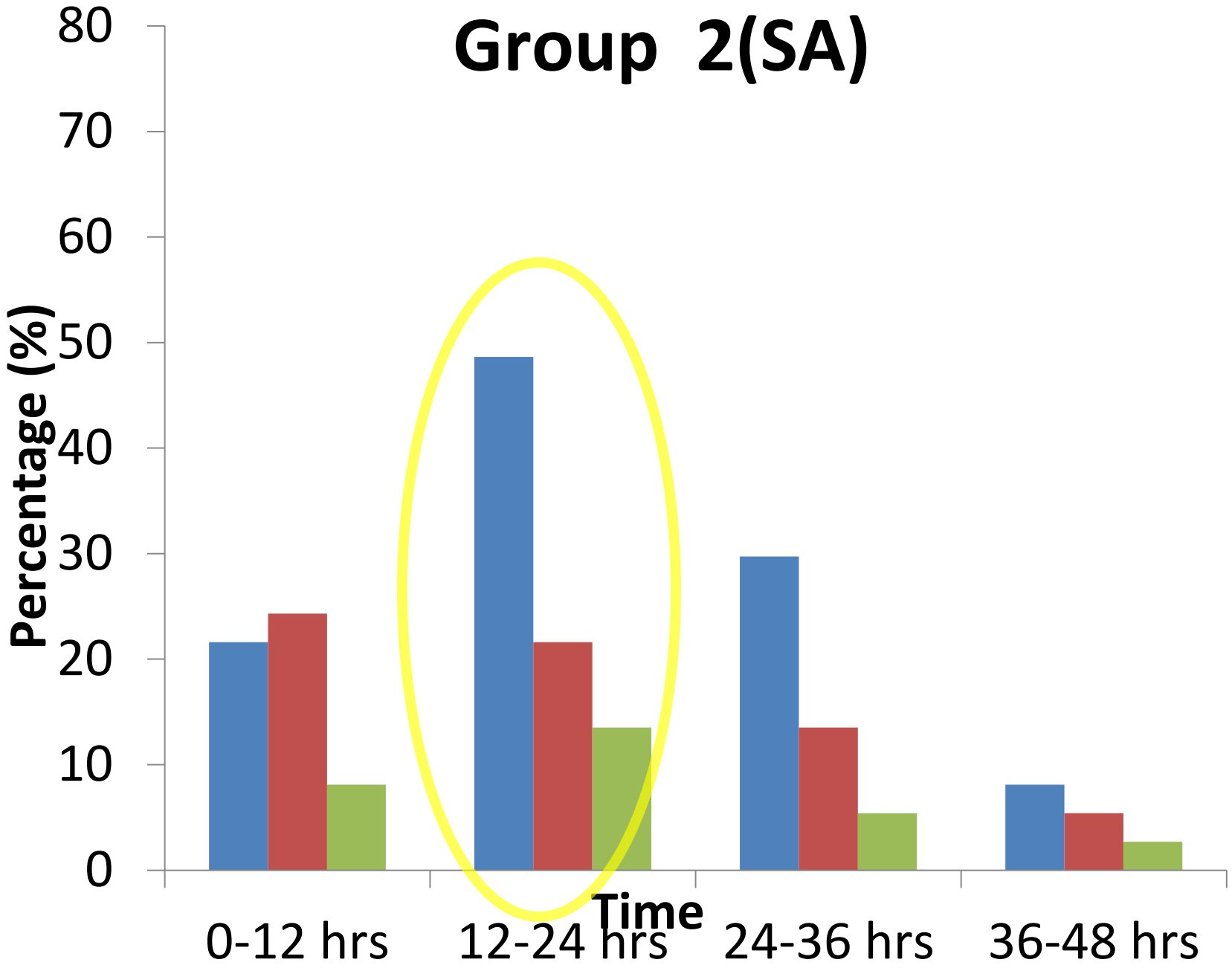
PainKwell Pain Pump

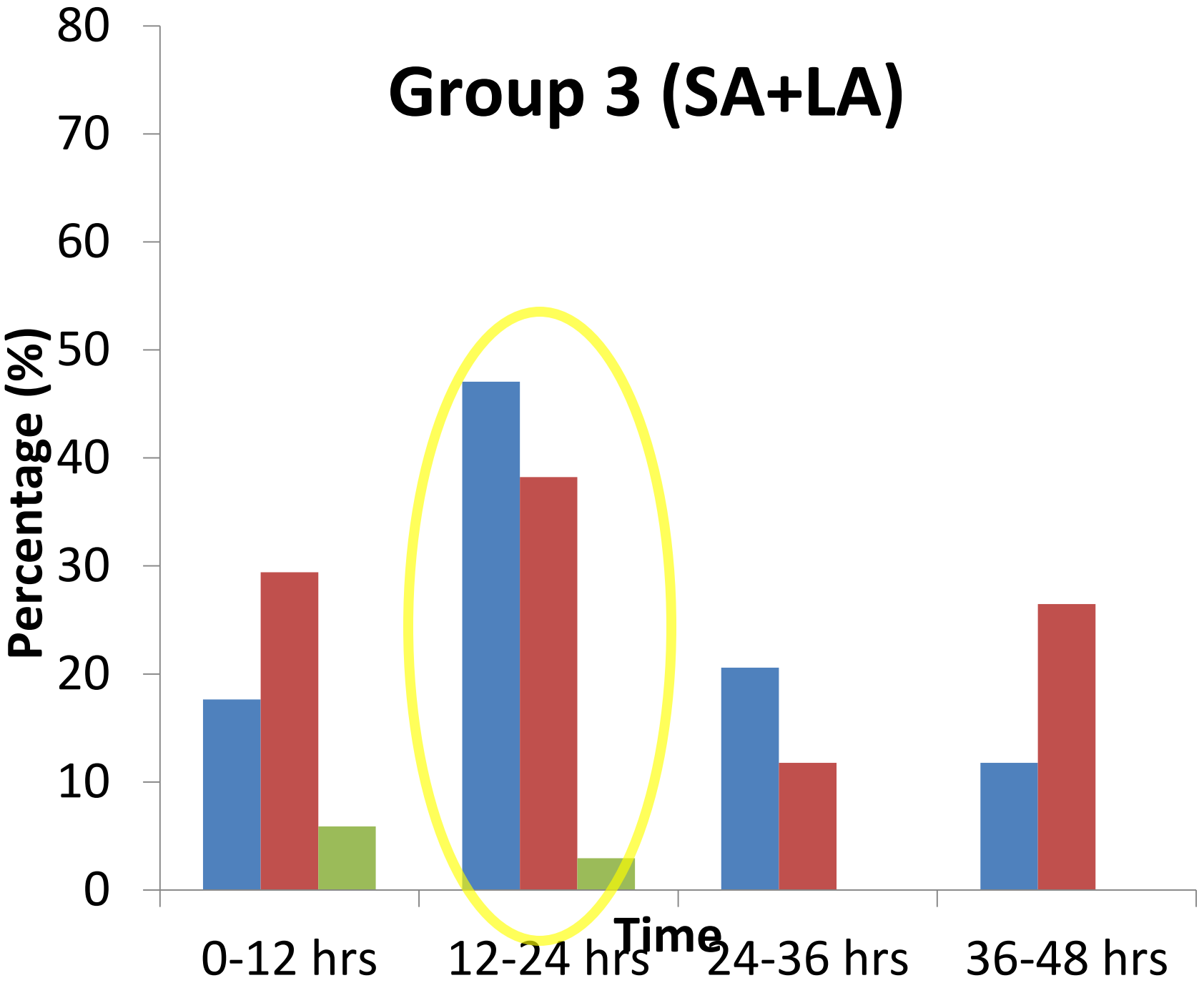
- Pump reservoir to catheter
- 0.25% bupivicaine 4mls/hr
- Patients fully mobile

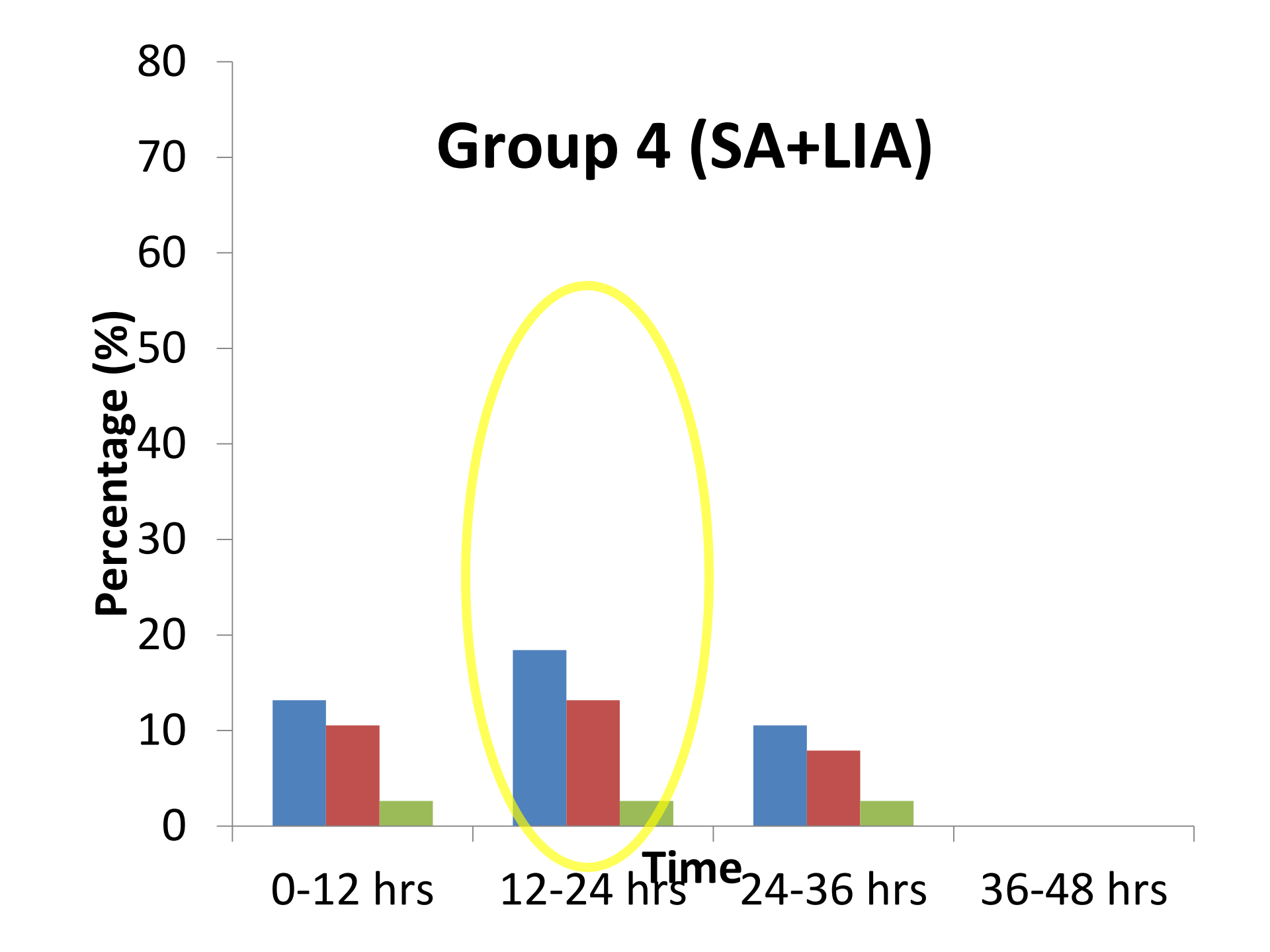


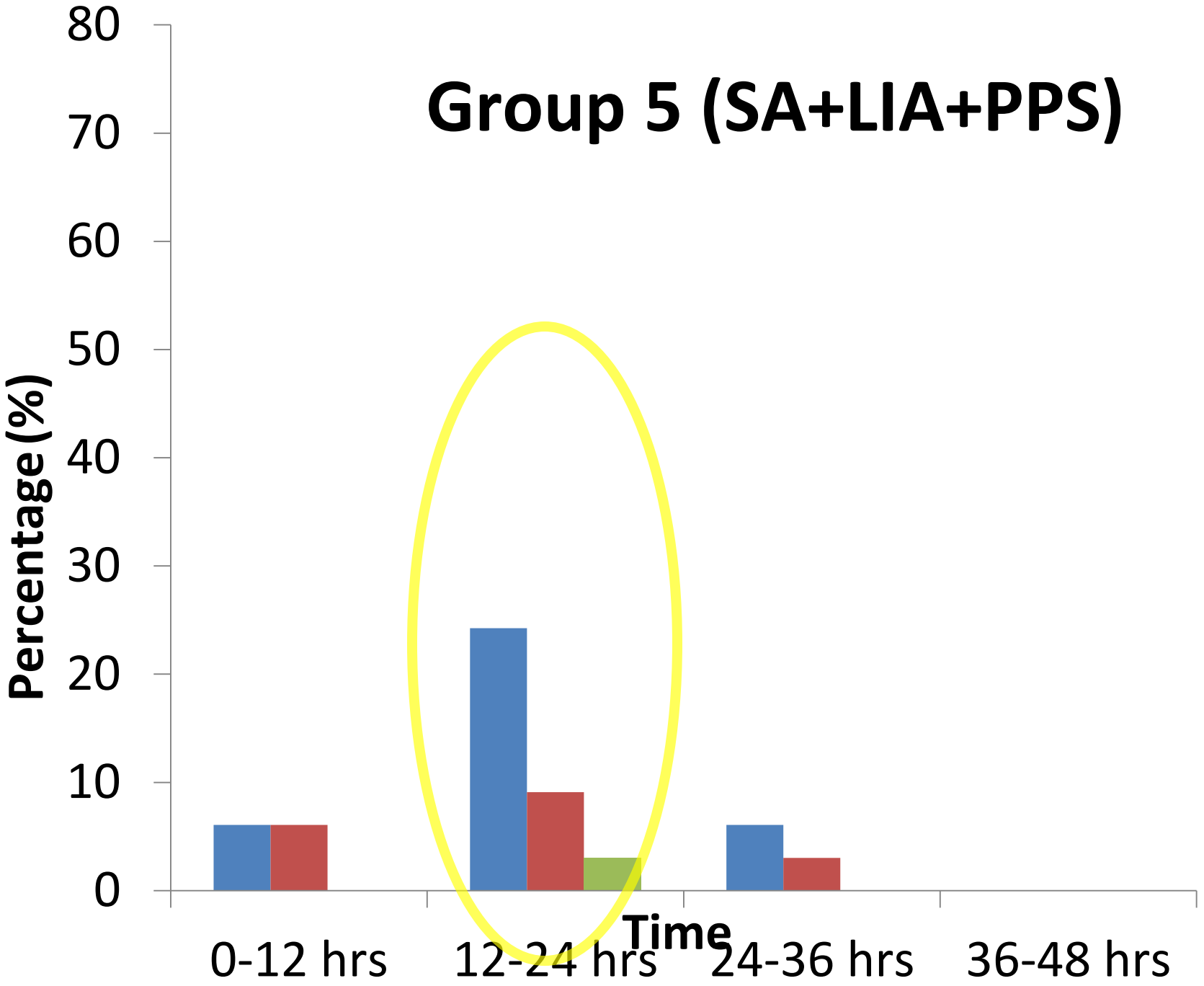



Results. GP 1(GA)
80
70
60
50
40
30
20
10
0
Percentage (%)
morphine (10mg)
morphine (20 mg)
morphine (30 mg)
Time
0-12 hrs
12-24 hrs
24-36 hrs
36-48 hrs

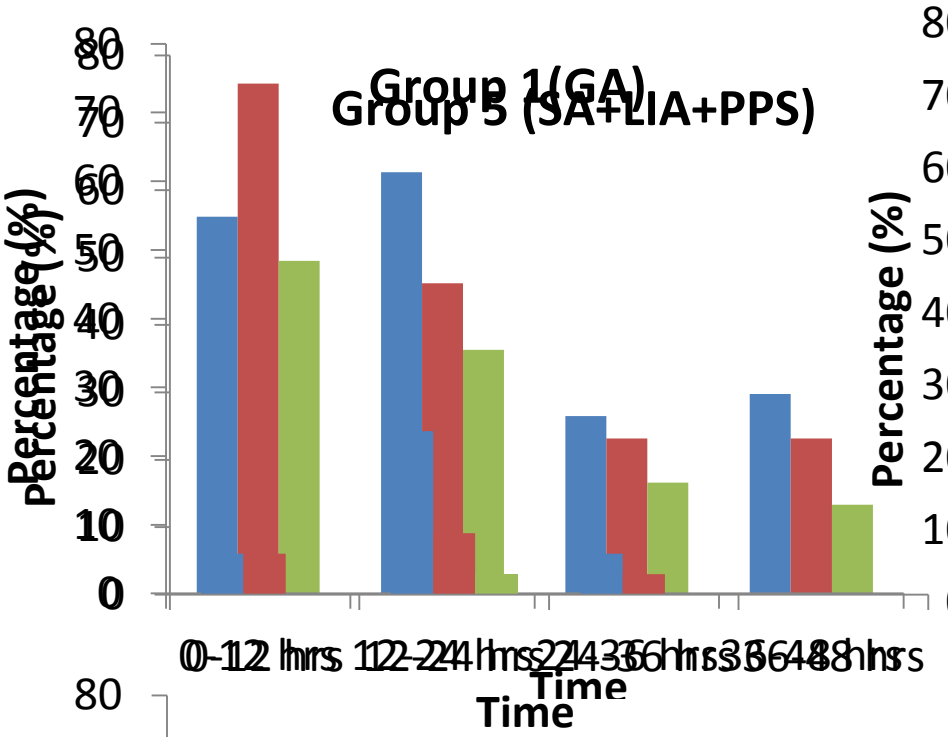

Group 2(SA)
80
70
60
50
40
30
20
10
0
Percentage (%)
Time
0-12 hrs
12-24 hrs
24-36 hrs
36-48 hrs

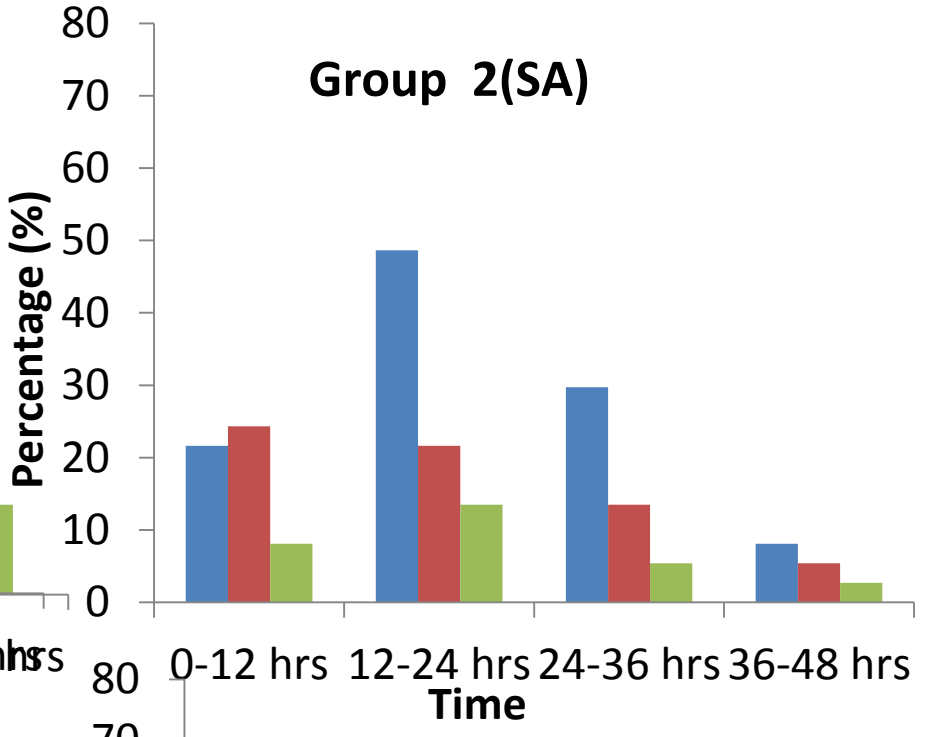

Group 3 (SA+LA)
Percentage (%)
80
70
60
50
40
30
20
10
0
0-12 hrs
12-24 hrs
24-36 hrs
36-48 hrs
Time

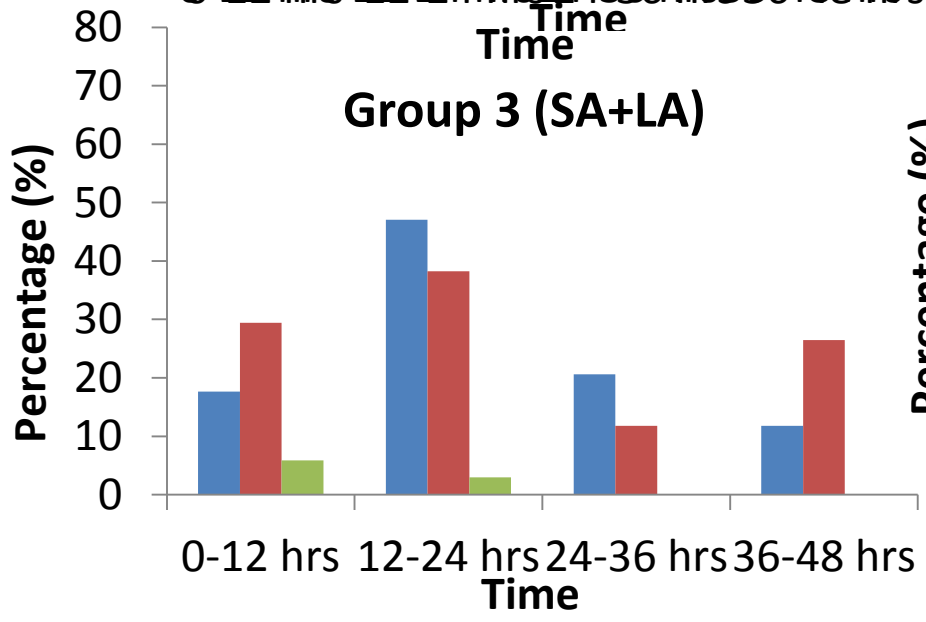

Group 4 (SA+LIA)
Percentage (%)
80
70
60
50
40
30
20
10
0
0-12 hrs
12-24 hrs
24-36 hrs
36-48 hrs
Time

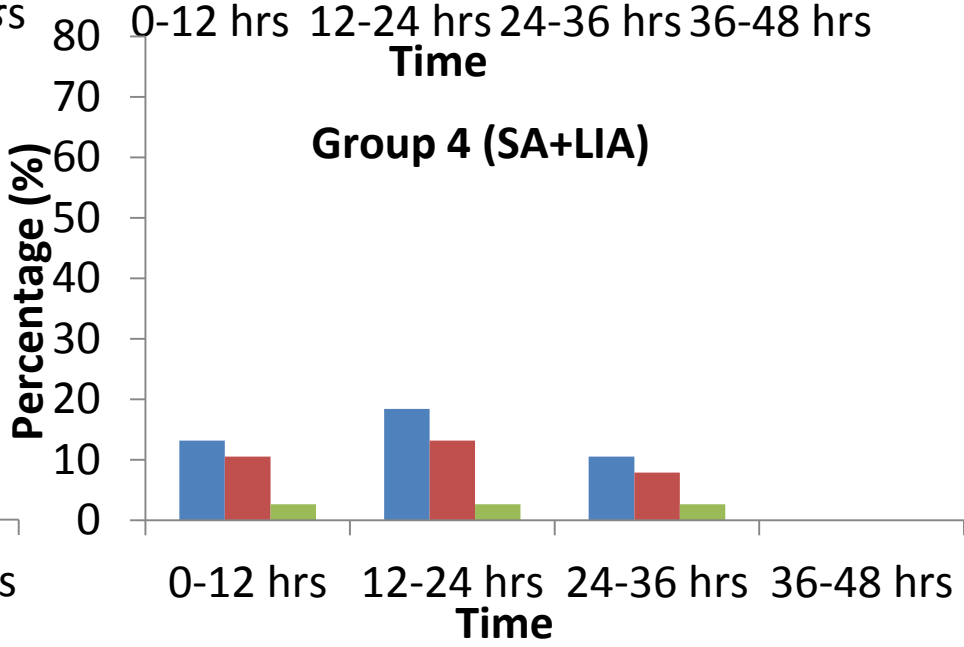

Group 5 (SA+LIA+PPS)
Percentage (%)
80
70
60
50
40
30
20
10
0
Time
0-12 hrs
12-24 hrs
24-36 hrs
36-48 hrs

Rebound Pain in THRs





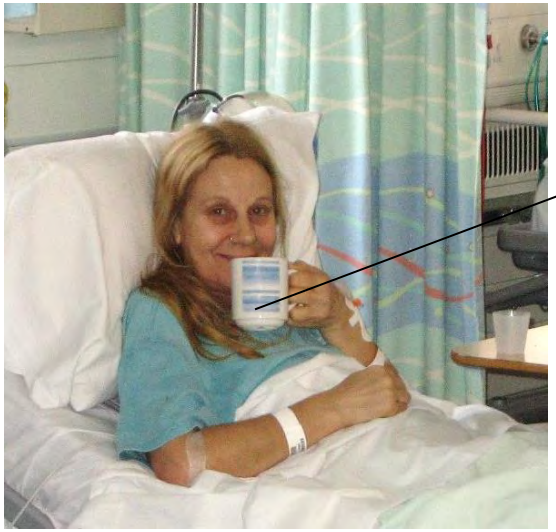




Conclusion

- Statistically significant difference in morphine usage.
- 50% less opiate usage in groups using LIA compared to the GA group.
- SA+LIA+PainKwell pain pump group 30% less “rebound pain“ than SA+LIA group during 0-24hrs.
- SA + LIA + PainKwell pump system is now used in all elective hips and knees by senior author.

For PainKwell Technique and Information



“Felt no pain at all after my hip operation”

www.painkwell.com

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SOCIETÀ ITALIANA DELL'ANCA

26-27 NOVEMBER 2015

MILAN, ITALY

BRITISH HIP SOCIETY

York Teaching Hospital NHS
NHS Foundation Trust

VENOUS THROMBOEMBOLISM AFTER LOWER LIMB ARTHROPLASTY:

Does Chemical Prophylaxis Reduce The Risk?

Karan Malhotra, *Jan L Marciniak, Sandra Bonczek, Neil Hunt*

York Teaching Hospital (York, UK)

Introduction

- VTE is a feared complication of Hip / Knee Arthroplasty
- **Without prophylaxis:**
  - DVT: 40-60% (1)
  - Symptomatic VTE: 3.4% (2)
  - PE Related Mortality: 0.34% (3)
- In the UK, NICE guidance on VTE prophylaxis in Orthopaedic Patients (2007) – widely adopted in clinical practice
- **We have a high volume elective unit which adopted NICE Guidance in 2008**

Aims

- To compare our rates of VTE and VTE related mortality before and after introduction of routine use of chemical prophylaxis

- **To see if these changes have positively impacted the rate of VTE / rate of fatal PE**

Orthopaedic Unit at York, UK

	Pre-2008	Post-2008
Anaesthesia	Regional	Regional
Fluid Therapy	Goal-directed	Goal-Directed
Analgesia	Multi-modal	Multi-modal
Mobilisation	Early-post operative	Early post-operative
Mechanical Prophylaxis	Pneumatic Compression Devices + Thromboembolic Deterrent Stockings	Pneumatic Compression Devices + Thromboembolic Deterrent Stockings
Chemical Prophylaxis	**High risk patients only**	**All patients**

Methods

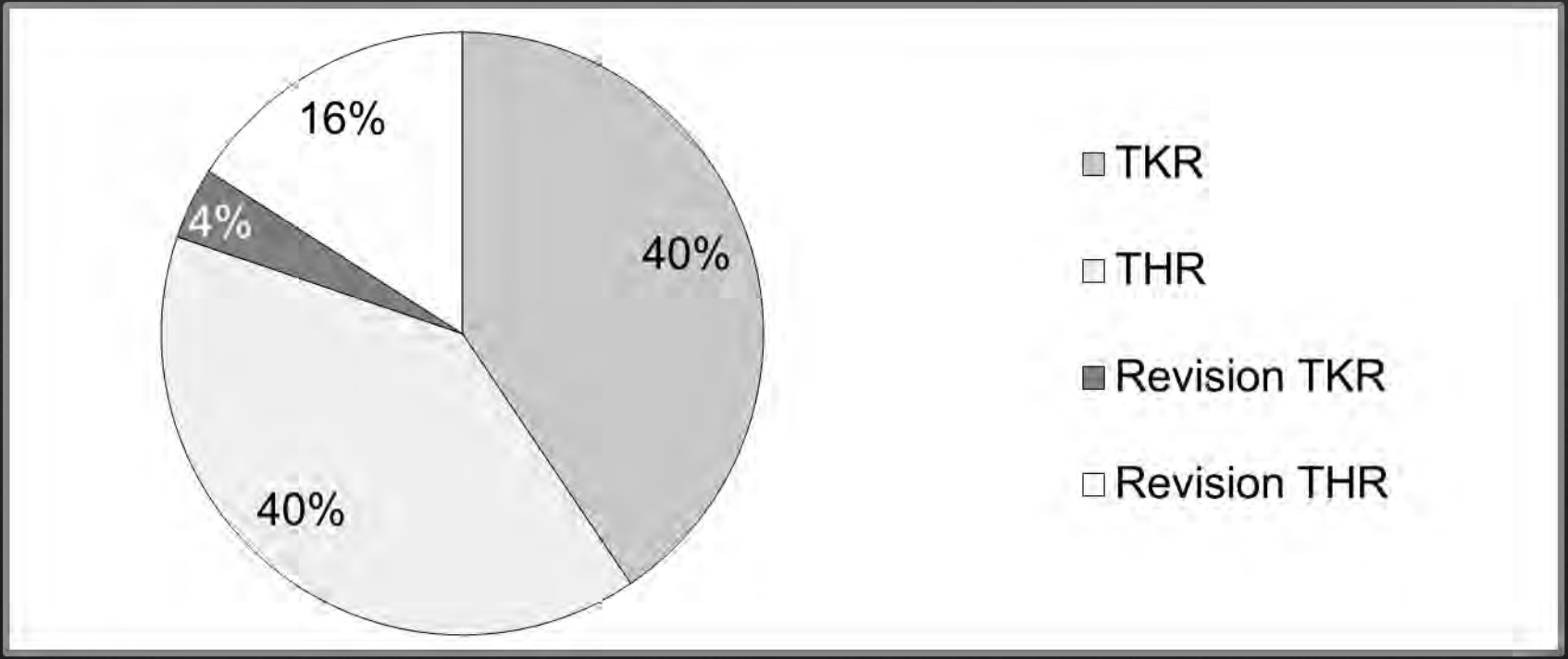
- Retrospective review of all Revision & Primary Total Hip and Knee Arthroplasty at our unit

- Pre-Chemical Prophylaxis: Jan'04 – Aug'07 (44 months)
  - *Group 1 (Excluded patients on LMWH)*

- Post-Chemical Prophylaxis: Jan'10 – Dec'12 (36 months)
  - *Group 2 (LMWH for 35 days for Hips and 10 days for Knees)*

- **VTEs & deaths occurring within 6 months of surgery**

Results - Types of Surgery



Results – Difference in VTE

	Number of Patients	Overall VTE Rate	DVT Rate	PE Rate	PE Related Mortality
Group 1	2320	37 (1.59%)	21 (0.91%)	17 (0.73%)	1 (0.04%)
Group 2	1430	17 (1.29%)	**3 (0.21%)**	14 (0.98%)	0 (0%)
Literature Pre- 'Fast-track' recovery (No chemical prophylaxis)					
Warwick, 1995 (2)	1162	**40 (3.44%)**	**22 (1.89%)**	**18 (1.55%)**	**4 (0.34%)**
Literature Post- 'Fast-track' recovery + chemical prophylaxis					
Husted, 2010 (4)	1977	**17 (0.86%)**	11 (0.56%)	6 (0.30%)	0 (0%)

Significant differences in rates of VTE from Group 1 are highlighted

Discussion

- The introduction of fast track surgery has significantly reduced the rate of VTE and VTE related mortality
  - **Compared to previous literature**
- **Further addition of chemical prophylaxis = unclear benefit**
- VTE rate decrease = 0.3% - 0.6% (not significant)
  - **Underpowered (require 7,500 pts in each group)**
- Have not correlated with bleeding risk

Conclusion

- **Fast track surgery reduces the rate of VTE and VTE related mortality**
- We found a reduction in DVT rate with introduction of chemical prophylaxis, but not in overall VTE rate
- Overall clinical benefit of chemical prophylaxis is small when using ‘fast track’ surgery
- **It remains unanswered whether chemical prophylaxis in its current form is required / cost effective in all patients**

References

- (1) **Imperiale TF, Speroff T.** A meta-analysis of methods to prevent venous thromboembolism following total hip replacement. *JAMA*. 1994;271(22):1780-5.

- (2) **Warwick D, Williams MH, Bannister GC.** Death and thromboembolic disease after total hip replacement. A series of 1162 cases with no routine chemical prophylaxis. *J Bone Joint Surg Br*. 1995;77(1):6-10.

- (3) **Howie C, Hughes H, Watts AC.** Venous thromboembolism associated with hip and knee replacement over a ten-year period: a population-based study. *J Bone Joint Surg Br*. 2005;87(12):1675-80.

- (4) **Husted H, Otte KS, Kristensen BB, Orsnes T, Wong C, Kehlet H.** Low risk of thromboembolic complications after fast-track hip and knee arthroplasty. *Acta Orthop*. 2010;81(5):599-605.

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East and North Hertfordshire NHS
NHS Trust

Clinical audit

Is Extended Venous Thromboembolism Prophylaxis Being Prescribed Correctly After Elective Total Hip and Knee Arthroplasty and Fracture Neck Of Femur Surgery?

International Combined Meeting
British Hip Society and Societa Italiana Dell'anca
27 November 2015

Dr Zahir Mughal (CT1)
Mr Shigong Guo (ST6)
Mr Sami Al-Ali (ST5)
Mr Rajesh Sofat (Clinical Director)

Introduction

- An estimated 25,000 people in the UK die from preventable hospital-acquired venous thromboembolism (VTE) every year.
- Patients undergoing hip and knee arthroplasty have an **extended venous thromboembolism risk.**
- The risk of developing VTE after surgery can be significantly reduced using **pharmacological** prevention.
- Patients undergoing hip and knee arthroplasty require VTE prophylaxis to continue often **after discharge**.

NICE Guidelines

Venous thromboembolism Prophylaxis

- National Institute for Health and Clinical Excellence (NICE) guidelines, and our local hospital policy, states that pharmacological VTE prophylaxis should be continued for at least:
  - Elective hip replacement: **28 - 35** days post-operatively.
  - Elective knee replacements: **10 - 14** days post-operatively.
  - Neck of femur fracture surgery: **28 - 35** days post-operatively.

Clinical Question

- Are we following the NICE guidelines for DVT prophylaxis when completing the discharge summary for:
  - Elective total hip replacement
  - Elective total knee replacement
  - Neck of femur fracture surgery

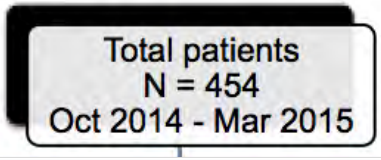
Methods

- **A retrospective analysis of electronic discharge summaries for all patients who underwent:**
  - Elective Hip Replacements,
  - Elective Knee Replacements,
  - Surgery for Neck Of Femur Fractures,
- **Over the period October 2014 – March 2015**.
- **Exclusion**:
  - Contraindication to anticoagulation.
  - Inpatient length of stay greater than the length of VTE duration required

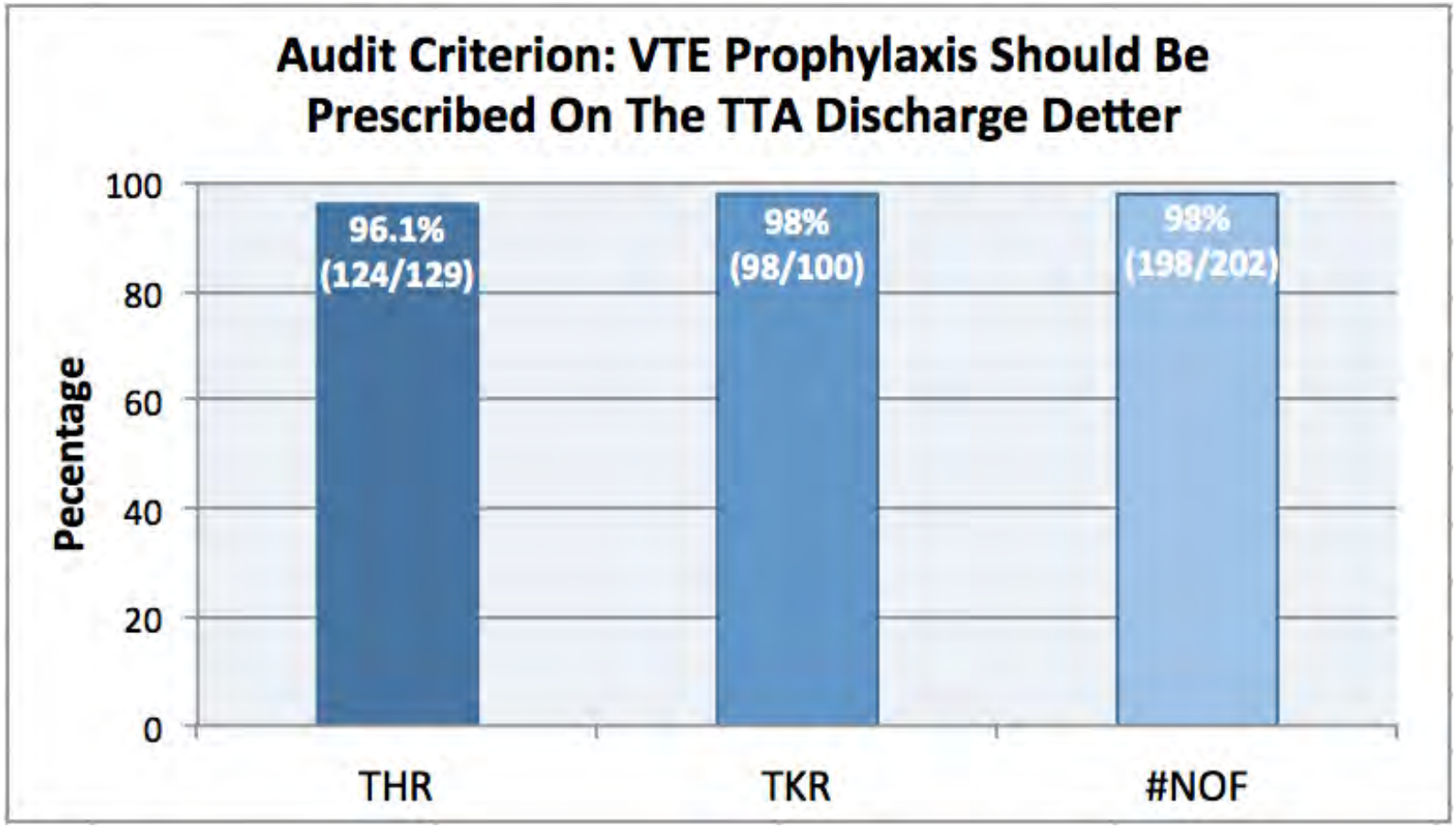
Audit Criteria and Standards

- **Criteria**:
  1. VTE pharmacological prophylaxis should be prescribed on the discharge letter.
  2. Length of prescription should be as per NICE guidelines.
- **Standard**: 100% for both criteria.

Results



Results


Audit Criterion: VTE Prophylaxis Should Be Prescribed On The TTA Discharge Detter
Pecentage
100
80
60
40
20
0
96.1% (124/129)
98% (98/100)
98% (198/202)
THR
TKR
#NOF

Other key findings

- Length of total VTE prophylaxis:
  - **THR**:

Standard	Mode	Mean	Median	Range
28 days	28 days	28 days	28 days	10 - 56

    - VTE prescribed for < 28 days in **5.6% (7/124)** cases (subtherapeutic– no reason given)

Conclusion

- Excellent results overall.
- The secret to our success…
  - …The multidisciplinary team:
  - FY1s, SHOs, SpRs, Cons
  - Pharmacists
  - Nurses

- Questions.

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