

# INSTABILITÀ ARTICOLARE NELLE REVISIONI: SUE CRITICITA'

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CON IL PATROCINIO DI

PATROCINI RICHIESTI



AIR  
ASSOCIAZIONE ITALIANA  
RIPROTEZZAZIONE

## IX CONGRESSO NAZIONALE IL RECUPERO DELLE GEOMETRIE ARTICOLARI NELLE REVISIONI PROTESICHE

VERONA | GRAN GUARDIA | 7-8 MARZO 2024



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## INSTABILITÀ IN ITALIA

**3<sup>a</sup> causa** di revisione protesica (9.3%  
delle revisioni totali)

**Considerando solo i primi 2 anni** la  
percentuale sale fino al 26%

early revision THA. In the national register of Italy [7], recurrent dislocation is the cause of revision THA in 9.3% overall, after aseptic loosening and infection. In the regional register of Emilia-Romagna [8], dislocation is the cause of revision in 9%, but in the first two years this percentage increased to 26%. Furthermore, dislocation is the first cause of multiple revision (22.5%).

*Falez et al. Int. Orthop (2017) 41(3):635-644*

**Rate lussazione posteriore/anteriore = 3/1**

**Lussazione dopo primo impianto ~ 1%-3%**

**Lussazione dopo revisione ~ 7%-25%**

**Rischio maggiore nelle prime 12 settimane**

**60%-70% entro le prime 6 settimane**



Matthw T. Hummel, Madhusudhan R. Yakkanti (2009); *Decreased Dislocation After Revision Total Hip Arthroplasty Using Femoral Head Size and Posterior Capsular Repair*; The Journal of Arthroplasty, Vol. 24 No. 6 Suppl. 1

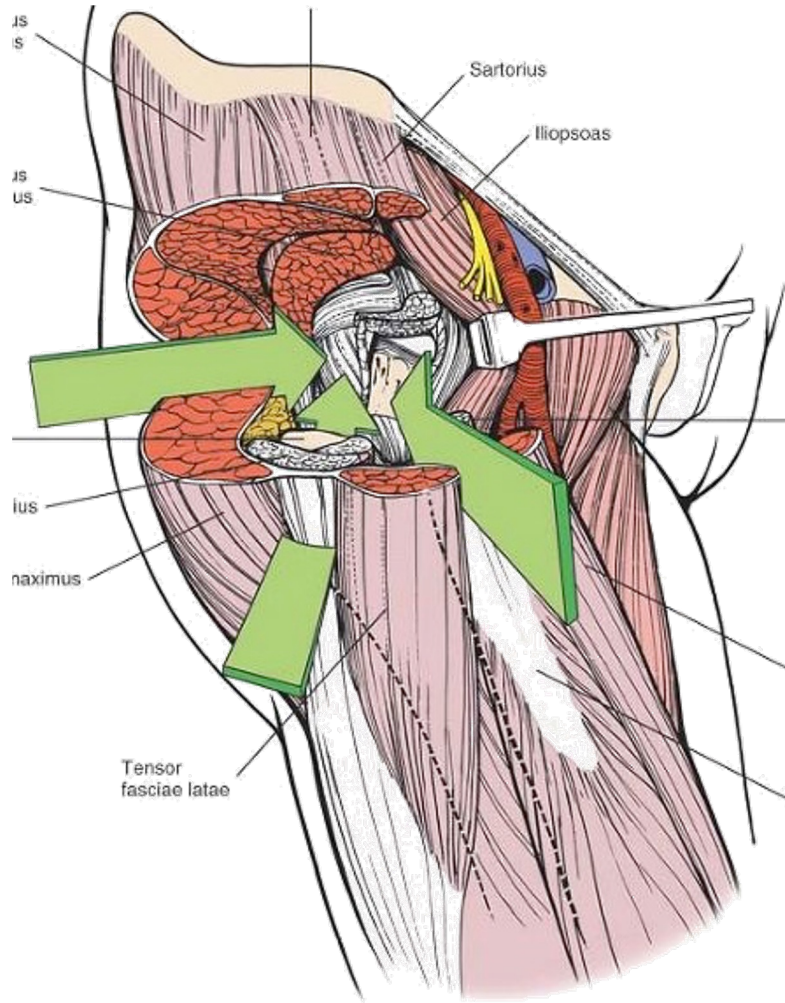
## 7. Expert commentary

Dislocation after THA is one of the most common complications that may require surgical intervention. **Appropriate component positioning, proper soft-tissue balancing, and restoration of anatomical offset and limb length are the most important aspects of preventing this complication.** The dual-mobility articulation may be a viable option for patients with abductor deficiency, neuromuscular disorders, and others at extreme risk of instability. The temptation for the wider adoption of these constructs should be avoided until definitive data regarding the long-term performance



STABILITÀ

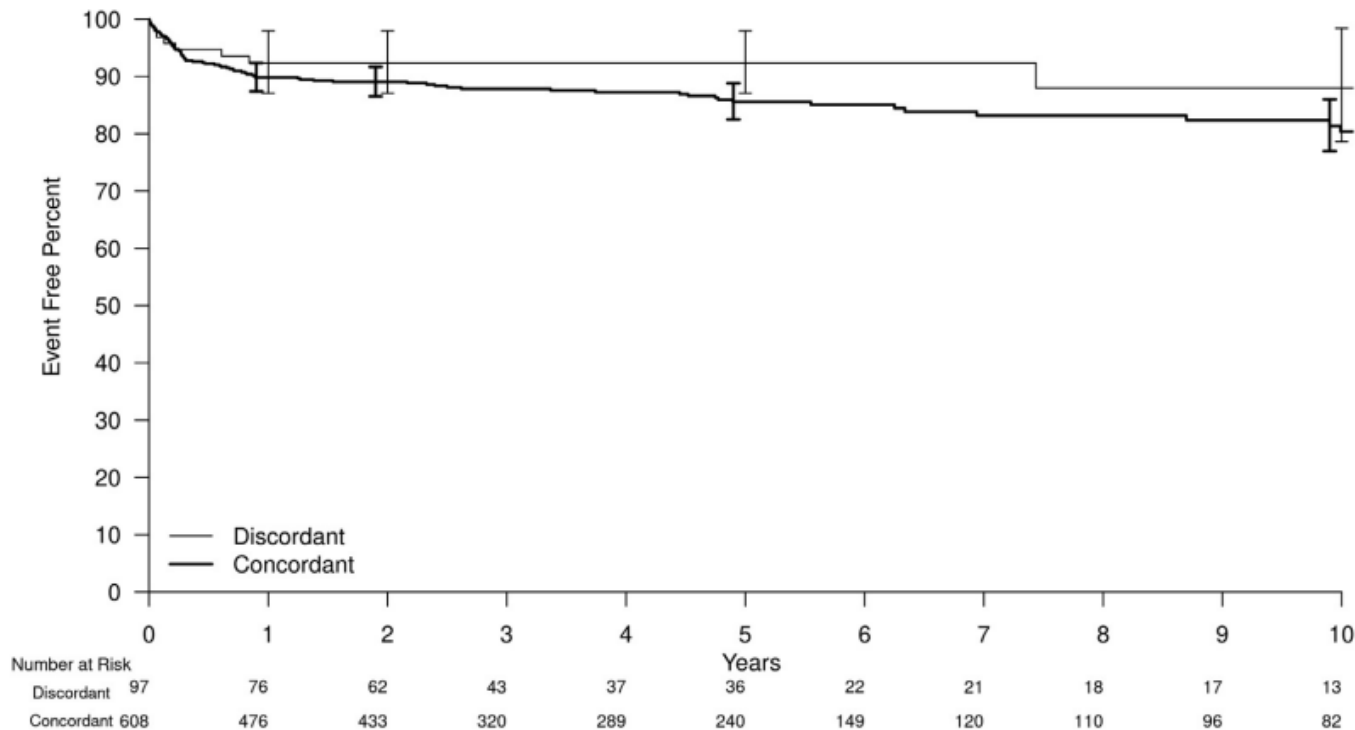
*Vahedi H, Makhdom AM, Parvoizi J. Expert Rev Med Devices. 2017 Mar;14(3):237-243*



# MOST REVISIONS ARE PERFORMED BY POSTEROLATERAL APPROACH

Could performing surgery  
through multiple planes  
potentiate dislocation risk??

## Survivorship Free of Dislocation



changing vs maintaining the surgical approach from primary to revision THA does not significantly increase dislocation risk or that of re-revision, reoperations, and nonoperative complications

J.R. Harmer et al. / The Journal of Arthroplasty 37 (2022) S622eS627

Detailed data on potential risk factors for dislocation after revision total hip arthroplasty and the outcomes of meta-analysis.

Potential risks	No of studies	Pooled OR or SMDs	LL95% CI	UL 95% CI	P value
Female (VS male)	7	1.061	0.856	1.316	0.589 <sup>a</sup>
<u>Age</u>	2	-0.222	-0.413	-0.031	0.023 <sup>a</sup>
Left(VS right)	2	0.729	0.502	1.06	0.098 <sup>a</sup>
<u>Femoral head size(≤28 mmvs32 mm)</u>	3	1.451	1.056	1.994	0.021 <sup>a</sup>
Aseptic loosening(VS other)	3	0.707	0.442	1.129	0.147 <sup>a</sup>
Bone-grafting	2	1.2	0.878	1.639	0.253 <sup>a</sup>
trochanteric osteotomy	3	0.99	0.72	1.361	0.952 <sup>a</sup>
Cup inclination	2	-0.356	-1.063	0.352	0.324 <sup>b</sup>
Cup anteversion	2	0.026	-0.167	0.219	0.791 <sup>a</sup>
BMI	2	0.502	-0.888	1.892	0.479 <sup>b</sup>
<u>History of instability</u>	3	2.739	1.888	3.974	<0.001 <sup>a</sup>
<u>Number of prior revisions≥3</u>	2	2.226	1.569	3.16	<0.001 <sup>a</sup>
<u>Number of prior revisions≥2</u>	2	1.949	1.349	2.817	<0.001 <sup>a</sup>
Constrained liners	3	0.66	0.222	1.959	0.454 <sup>b</sup>
single component revision vs multiple component revision	4	1.263	0.921	1.732	0.148 <sup>a</sup>
elevated rim	3	0.611	0.415	0.898	0.012 <sup>a</sup>

## Review and metanalysis on 4656 revision THAs

L. Guo et al. / International Journal of Surgery 38 (2017) 123e129

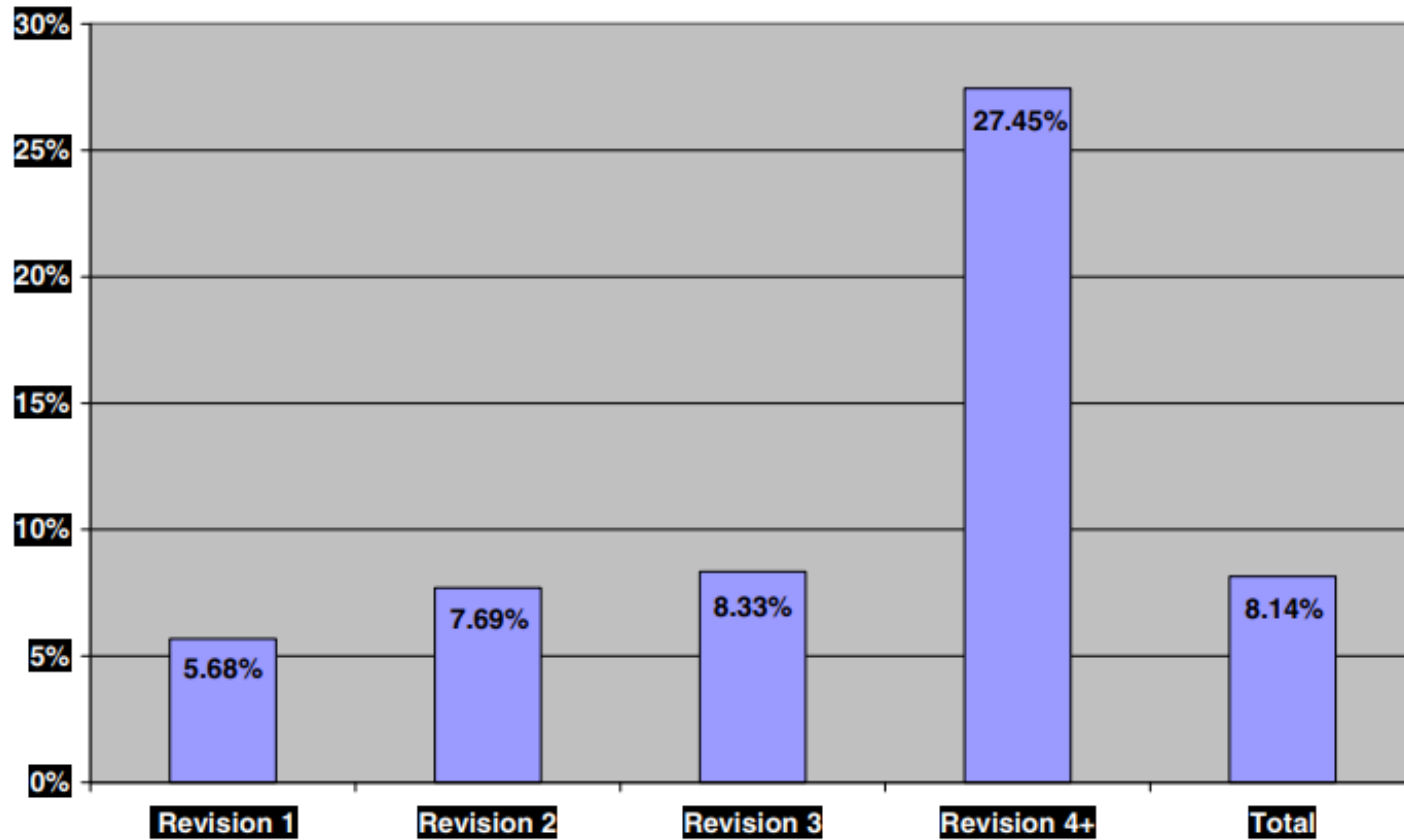


Fig. 1. Dislocation rates in each revision group.

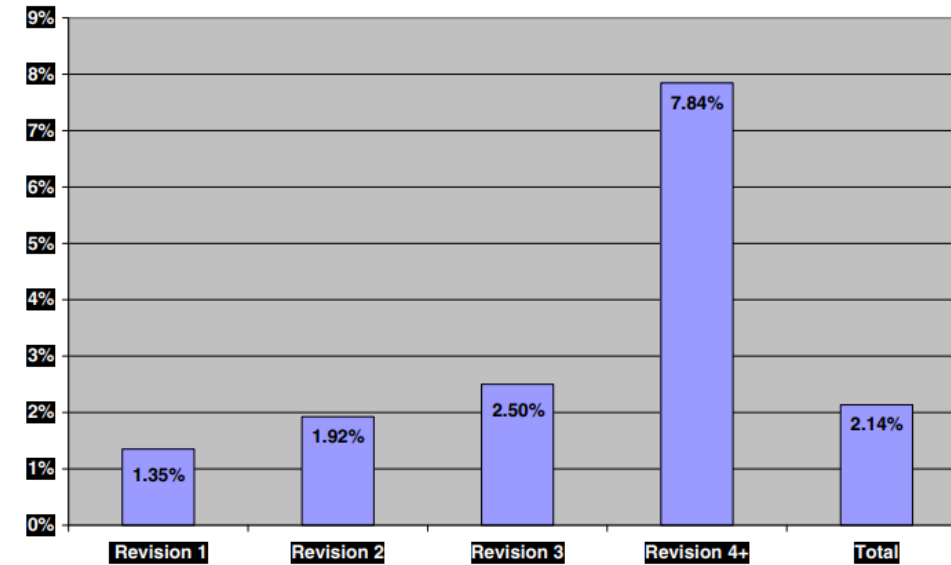


Fig. 2. Infection rates in each revision group.

The Journal of Arthroplasty Vol. 26 No. 8 December 2011



### Risk Factors for Re-Revision After Revision due to Either Dislocation or Aseptic Loosening.

Risk Factors for Re-Revision	Revisions due to Dislocation		
	Patients (No.)/ Re-Revision (No.)	Risk of Re-Revision, % (95% CI)	sHR (95% CI) - Adjusted
Overall	1678/332	19.8 (17.9-21.8)	
Age groups			
<65 y	360/101	28.1 (23.5-33.0)	<b>1.36 (1.05-1.77)</b>
65 – 75 y	660/129	19.5 (16.6-22.8)	1 (reference)
>75 y	658/102	15.5 (12.8-18.5)	0.82 (0.63-1.08)
Sex			
Male	691/142	20.5 (17.6-23.8)	0.99 (0.80-1.24)
Female	987/190	19.3 (16.8-21.9)	1 (reference)
CCI			
0	1168/252	21.6 (19.2-24.0)	1 (reference)
1 - 2	405/63	15.6 (12.2-19.5)	0.79 (0.60-1.05)
>2	105/17	16.2 (9.7-24.7)	0.80 (0.48-1.33)
Head size at 1. Revision			
<32 mm	613/132	21.4 (18.2-24.8)	1.02 (0.71-1.47)
32 mm	384/79	20.6 (16.6-25.0)	1.14 (0.79-1.64)
36 mm	286/49	17.1 (13.0-22.0)	1 (reference)
>36 mm	56/13	23.2 (13.0-36.4)	1.14 (0.60-2.14)
Unknown	339/60	17.7 (13.8-22.2)	0.86 (0.57-1.29)
Liner type at 1. revision			
Normal	632/125	19.8 (16.7-23.1)	1 (reference)
Constrained	520/89	17.1 (14.0-20.6)	0.86 (0.64-1.16)
DMC	100/12	12.0 (6.4-20.0)	1.05 (0.56-1.94)
Unknown	426/106	24.9 (20.8-29.3)	1.11 (0.84-1.48)
Extent of 1. revision			
Total	92/18	19.6 (12.0-29.1)	1.37 (0.83-2.27)
Acetabulum only	699/105	15.0 (12.5-17.9)	1 (reference)
Femur only	78/16	20.5 (12.2-31.2)	1.30 (0.74-2.28)
Head/liner only	809/193	23.9 (21.0-26.9)	<b>1.73 (1.34-2.23)</b>

## Danish Registry Data

Re-revision for any reason after first-time revision due to dislocation occurred in 19.8%, half (10.3%) occurred due to re-dislocation

L.L. Hermansen et al. / The Journal of Arthroplasty 36 (2021) 1407e141

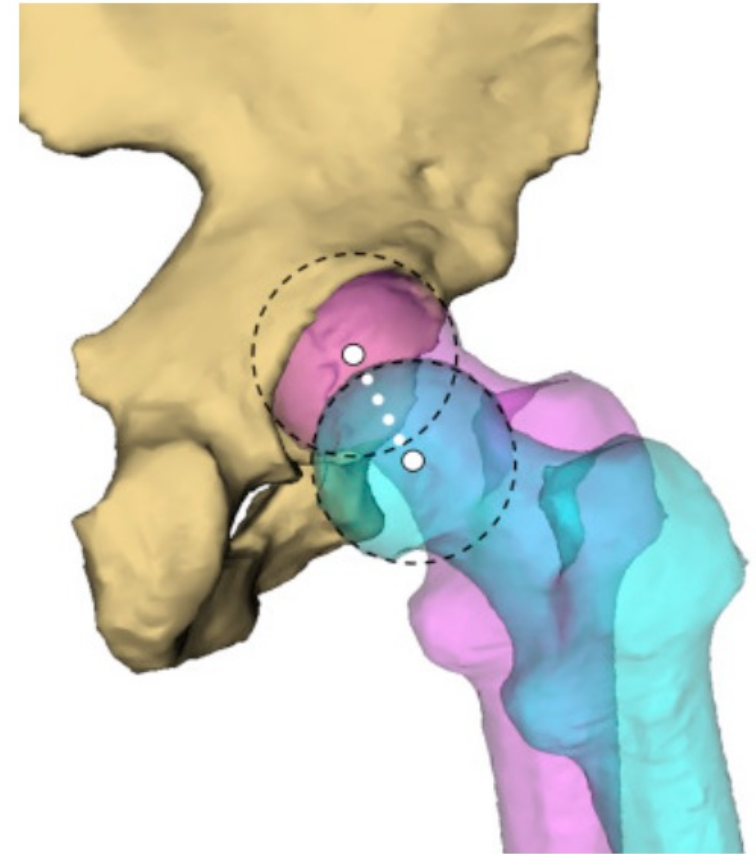
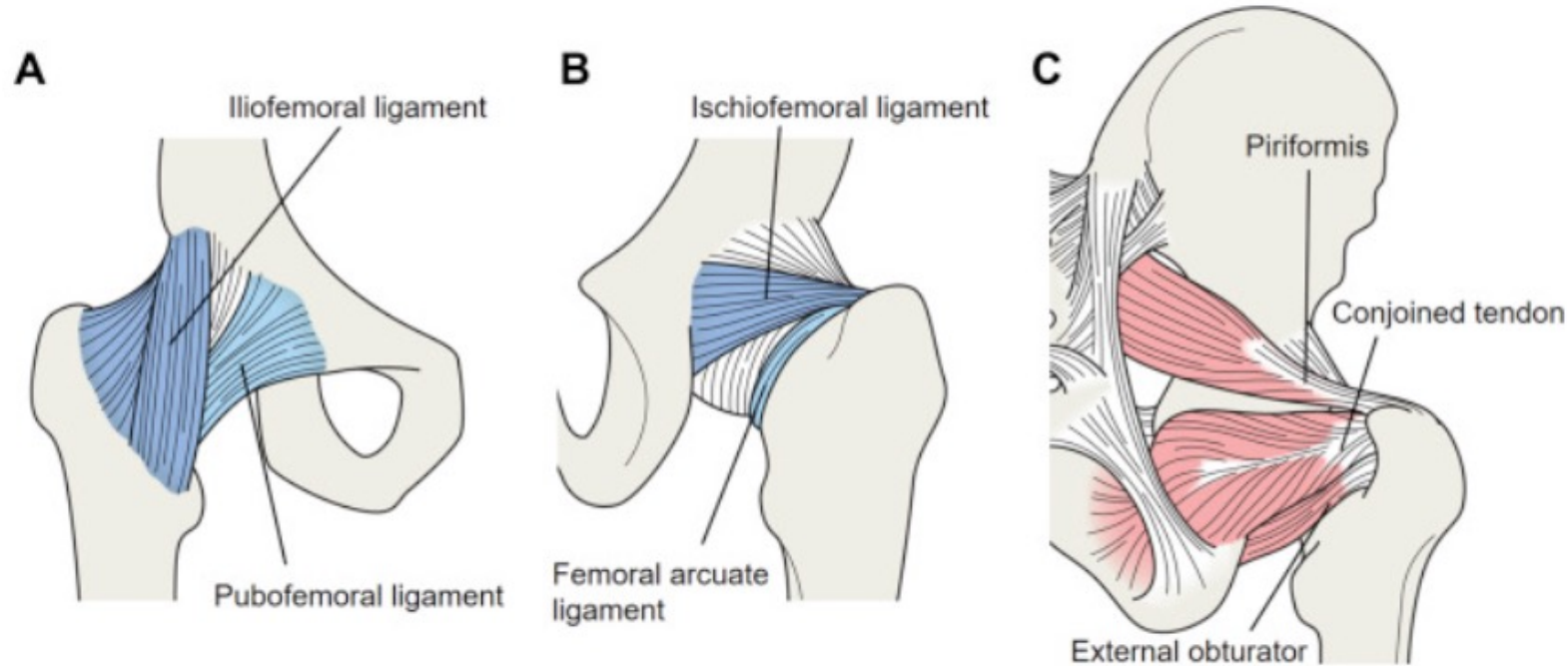
1

Il numero di precedenti revisioni e la revisione per instabilità sono i principali fattori di rischio, indipendentemente dall'accesso utilizzato

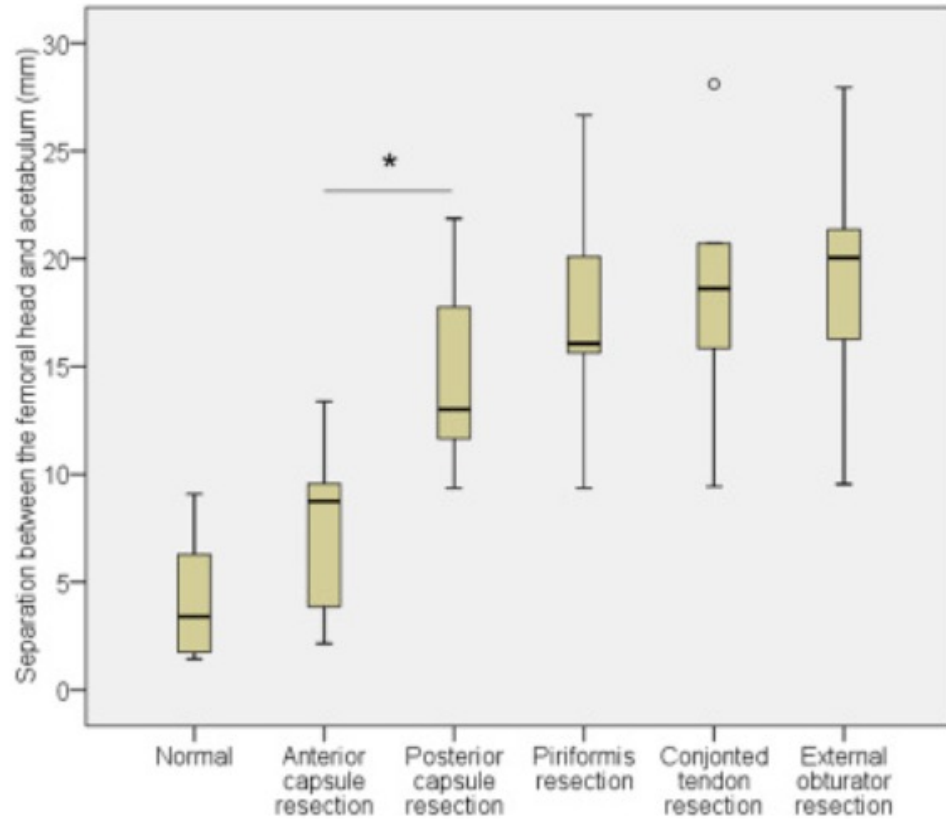
2

Dal punto di vista chirurgico, le revisioni che non comprendano il cotile (solo inserto e testina, solo femore) e l'utilizzo di testine piccole (28 mm o meno) aumentano il rischio di lussazione

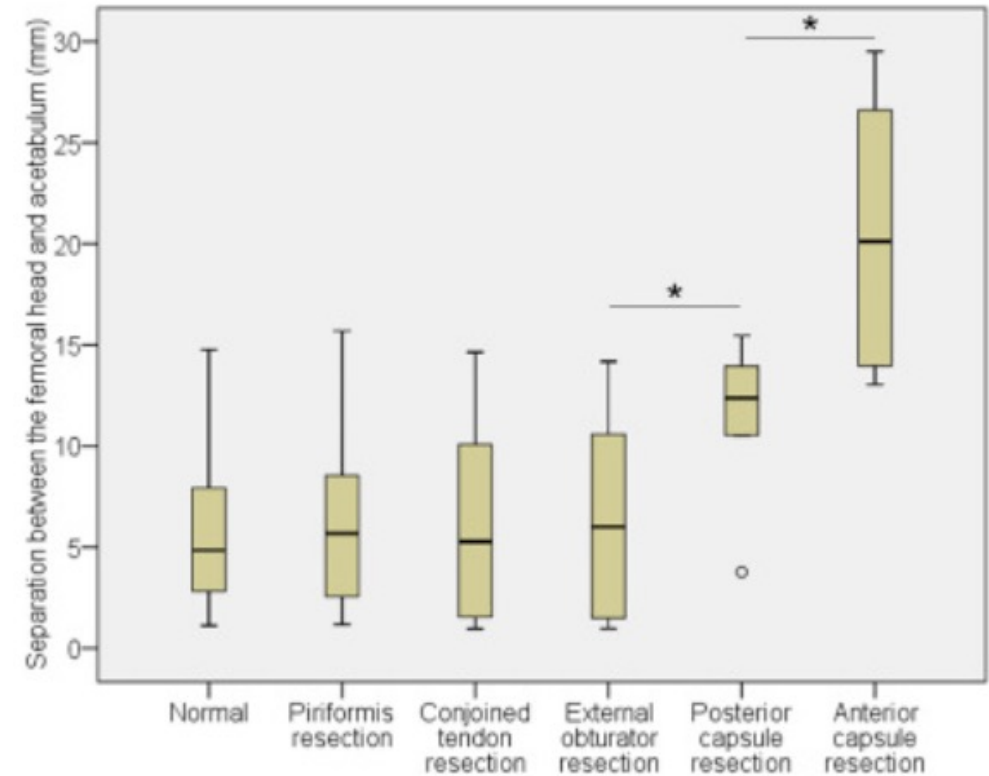
Criticità n 1: Danno sui tessuti molli (capsula posteriore ed anteriore, muscoli) e deficit osseo



## Anterior approach



## Posterior approach



↑ Jump distance quando si seziona la capsula posteriore

M. Takao et al. / The Journal of Arthroplasty 33 (2018) 919e924

## Classification System for the Unstable THA

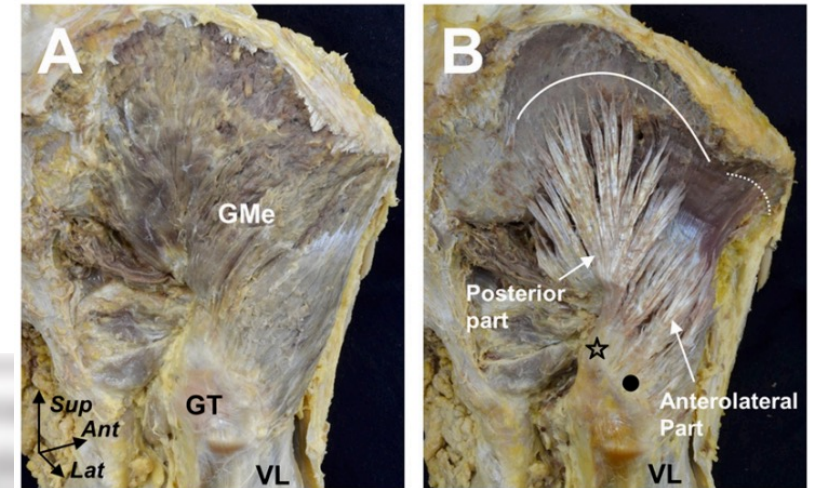
Type	Acetabular Component Orientation	Femoral Component Orientation	Abductor-Trochanteric Complex	Impingement	Late Wear
I	Incorrect	Correct	Intact	Absent	Absent
II	Correct	Incorrect	Intact	Absent	Absent
III	Correct	Correct	Absent	Absent	Absent
IV	Correct	Correct	Intact	Present	Absent
V	Correct	Correct	Intact	Absent	Present
VI	Correct	Correct	Intact	Absent	Absent

## Classification System for the Unstable THA

Patients undergoing THA can develop abductor mechanism deficiency as an iatrogenic complication (0.08-20%)

### Abductor-Trochanteric Complex

Intact  
Intact  
Absent  
Intact  
  
Intact  
  
Intact



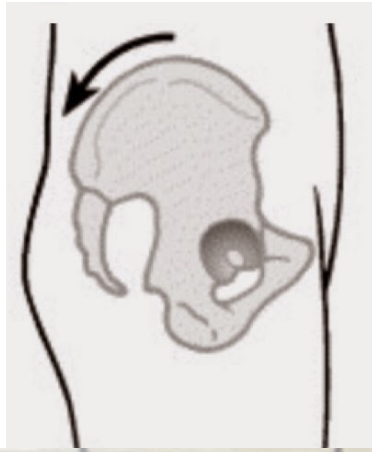
- Injury of the gluteus medius/minimus tendon
- Nonunion or absence of the greater trochanter
- Severe heterotopic ossification

**TABLE I Studies Evaluating Surgical Techniques for Posterior Hip Instability and Abductor Deficiency**

Authors	Country	Study Design	Years	No. of Patients	Procedure
Aboulaflia et al. (1995) <sup>83</sup>	U.S.	Retrospective, single-center	1988-1991	17	Acetabular reconstruction with saddle prosthesis
Masterson et al. (1998) <sup>60</sup>	Canada/Italy	Retrospective, multicenter	1989-1998	13	Capsular reconstruction with synthetic mesh
Barbosa et al. (2004) <sup>94</sup>	U.K.	Retrospective, single-center	Not mentioned	4	Synthetic ligament prosthesis
Whiteside et al. (2006) <sup>58</sup>	U.S.	Prospective, single-center	2006	5	Gluteus maximus transfer
Davies et al. (2009) <sup>54</sup>	U.K.	Prospective, single-center	2006-2008	16	Direct repair
Fehm et al. (2010) <sup>57</sup>	U.S.	Retrospective, single-center	2003-2006	7	Achilles tendon allograft
Van Warmerdam et al. (2011) <sup>72</sup>	U.S.	Retrospective, single-center	2000-2006	8	Achilles tendon allograft
Kohl et al. (2012) <sup>31</sup>	Switzerland	Retrospective, single-center	2000-2006	11	Vastus lateralis muscle shift
Jang et al. (2016) <sup>75</sup>	South Korea	Case report	2016	1	Gluteus maximus transfer
Barrera-Ochoa et al. (2017) <sup>81</sup>	Spain	Case report	2017	1	Latissimus dorsi free flap
Ricciardi et al. (2017) <sup>61</sup>	U.S.	Retrospective, single-center	2012-2016	7	Gluteus maximus advancement flap procedure
Chandrasekaran et al. (2017) <sup>77</sup>	U.S.	Retrospective, single-center	2011-2014	3	Gluteus maximus and TFL transfer

A failure rate as high as 31% has been reported

Even in those who undergo successful repair of the tendon and muscle, fatty degeneration is still detectable on MRI



## HIP-SPINE, WHAT'S ABNORMAL?





## E' SUFFICIENTE??

- Ignoriamo i cambiamenti nel tempo

- Deformità in futuro?
- Degenerazione in futuro?
- Fusione spinale in futuro?
- Ulteriori revisioni?

- Poco prevedibili le attività dei pazienti

- Non siamo in grado di stabilire il controllo neuromuscolare dinamico, soprattutto dopo una o più revisioni



## La colonna influenza il movimento della pelvi

- Deformità: Lordosi vs flat-back
- Flessibilità: Rigida vs flessibile

### In generale

- Tilt pelvico anteriore → richiede più antiversione
- Tilt pelvico posteriore → richiede meno antiversione
- Stiff spine → richiede più antiversione



Studio radiografico: AP della pelvi, lateral standing e lateral sitting

## HIP-SPINE RELATION, ANTEVERSION TARGETS

		Pelvic Tilt	
		Anterior Tilt	Posterior Tilt
Flexibility	Stiff	↑↑	-
	Flexible	↑	↓

Abdel MP, JOA 2019

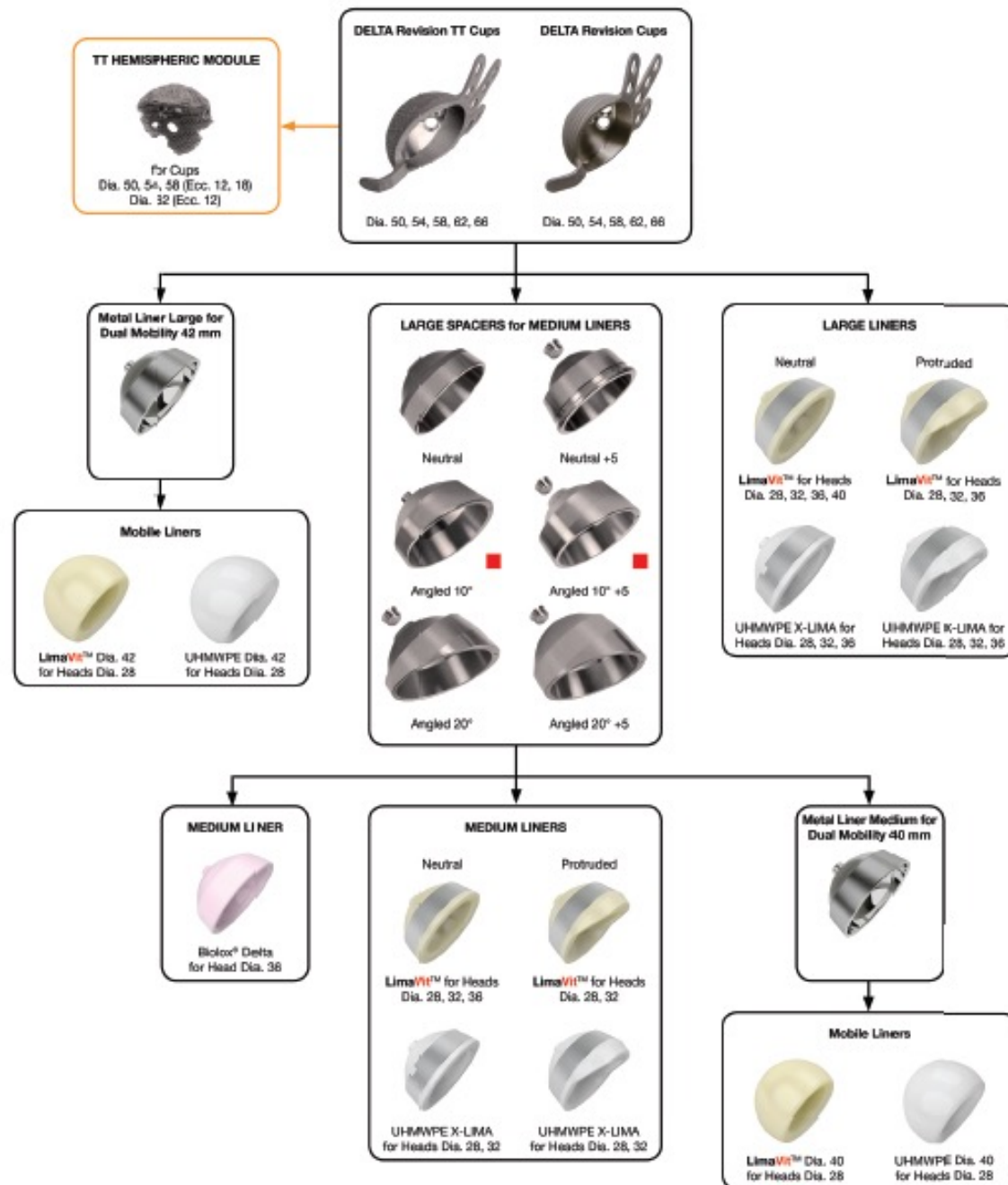
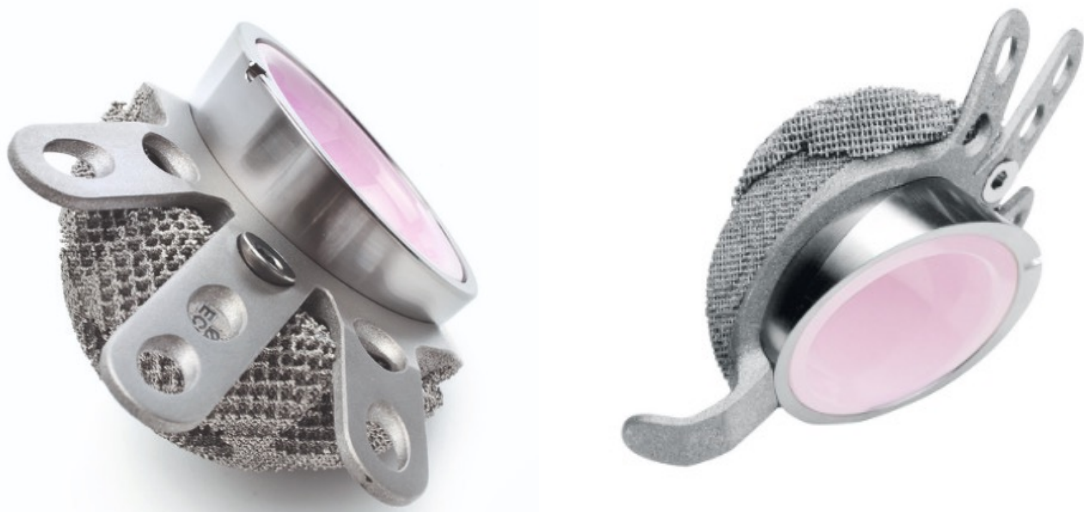
Risk factors in multivariate analysis for dislocation after revision THA at minimum 90 days' followup

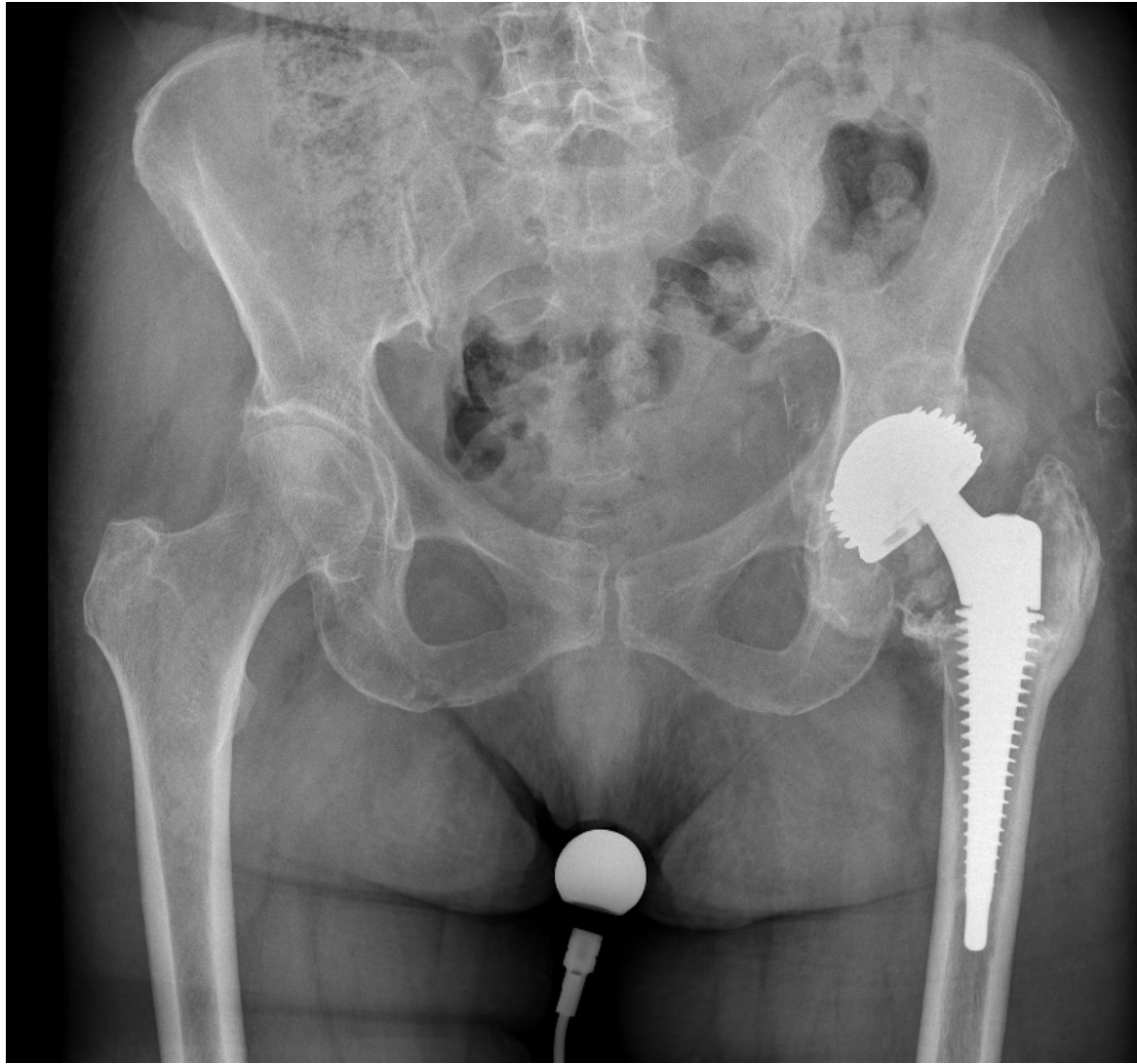
Variable	Odds ratio	95% CI		p value
Sex (female versus male)	1.471	0.940	2.303	0.091
Age	0.987	0.971	1.002	0.092
BMI	0.989	0.958	1.021	0.485
History of instability	2.673	1.637	4.365	0.001
Abductor deficiency	2.672	1.379	5.176	0.004
Constrained liner	0.503	0.273	0.925	0.027
Paprosky acetabulum classification	1.522	1.000	2.318	0.050
Head size	0.942	0.902	0.983	0.007

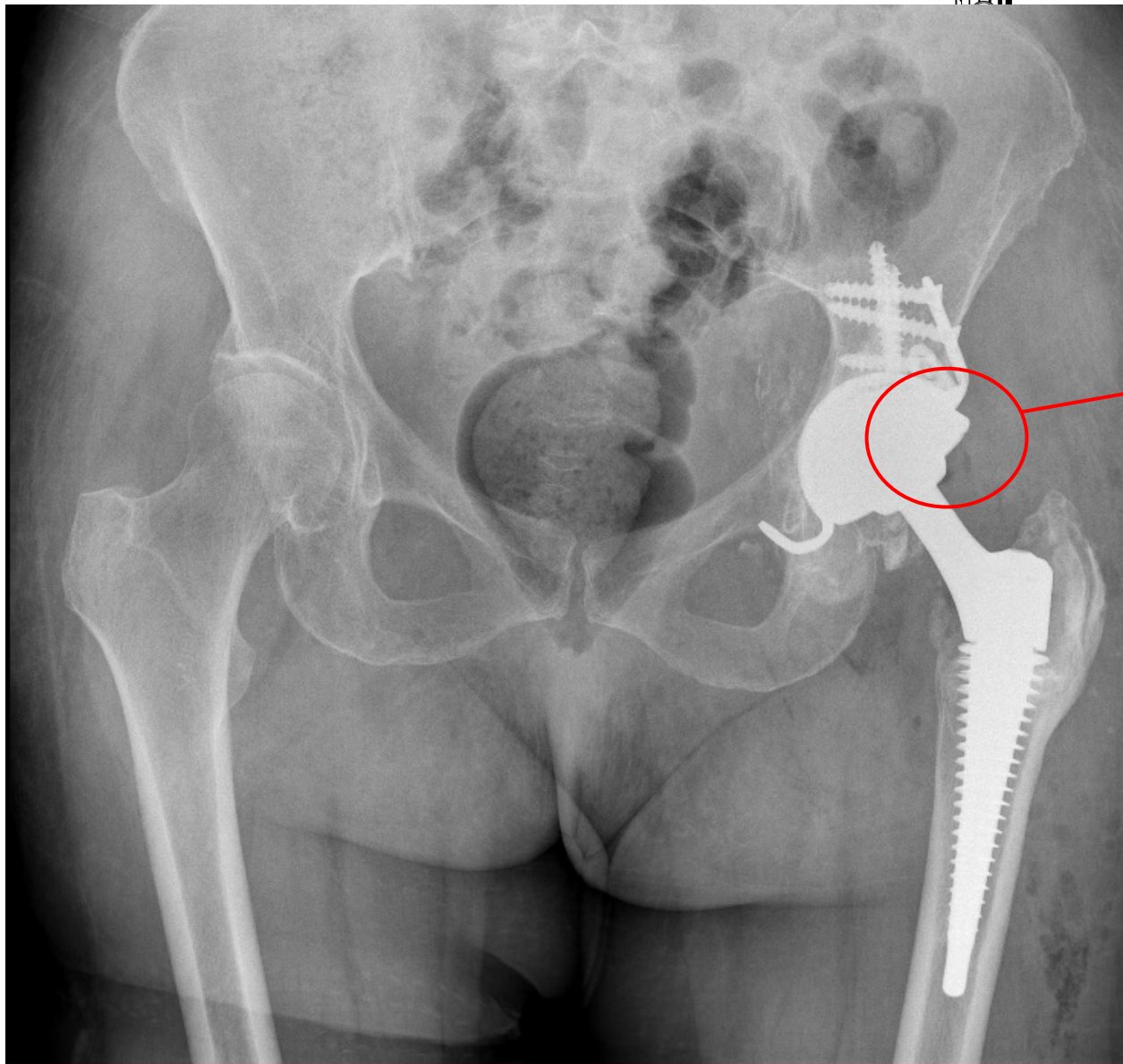
Il deficit osseo acetabolare influenza inevitabilmente il posizionamento del cotile, che può risultare subottimale!

Wetters et al, Clin Orthop Relat Res (2013)

# I costrutti acetabolari modulari ci aiutano!!



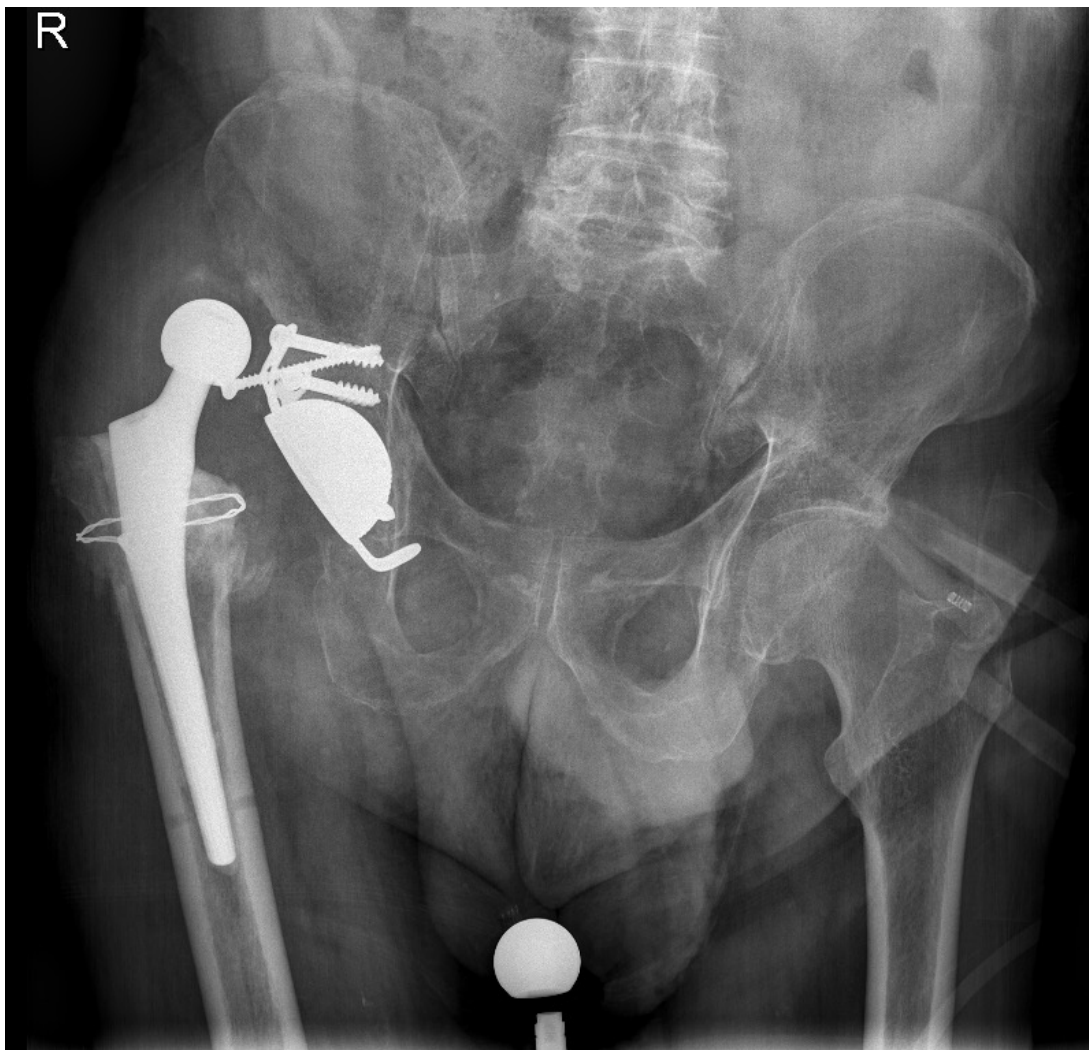




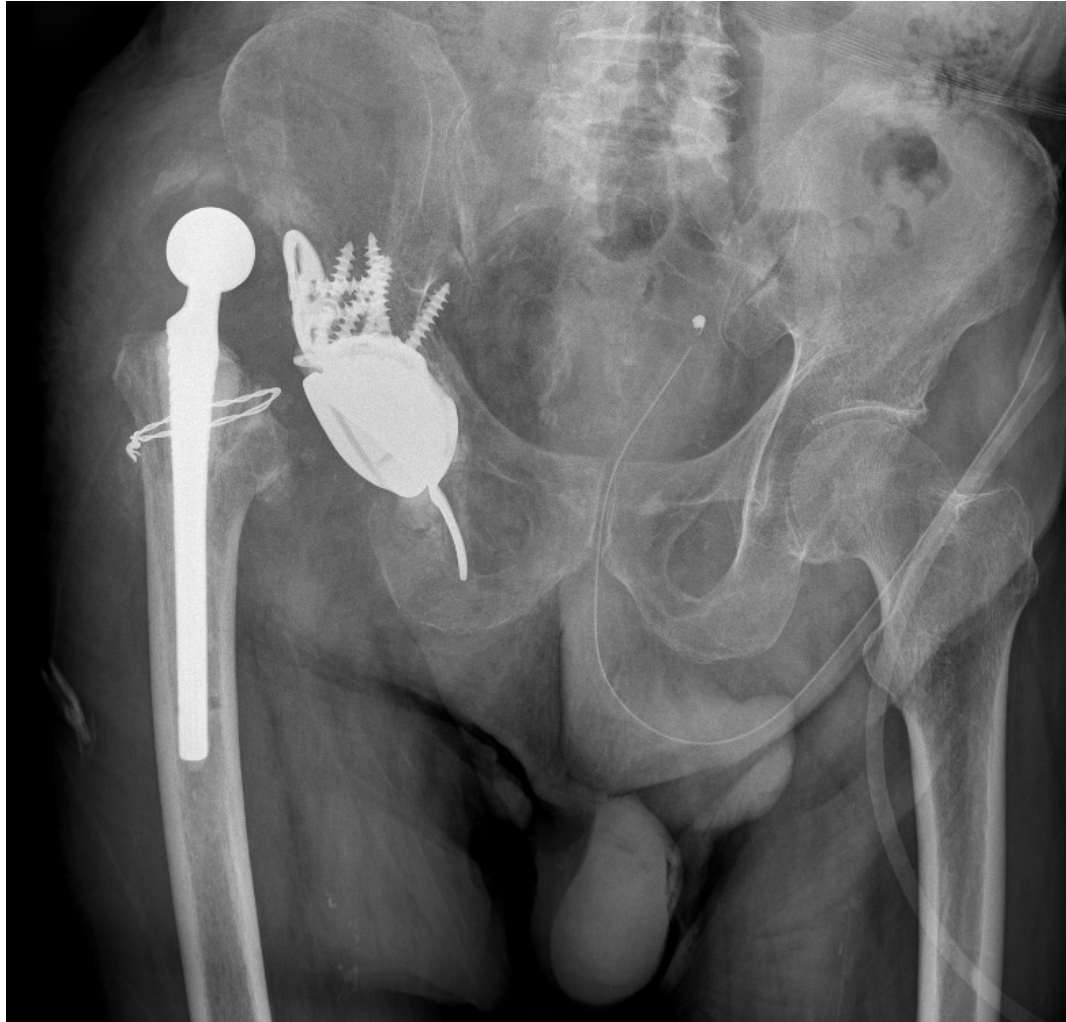
Spacer modulare per  
ottimizzare antiversione e  
inclinazione del cotile,  
possibilità di utilizzare dual  
mobility



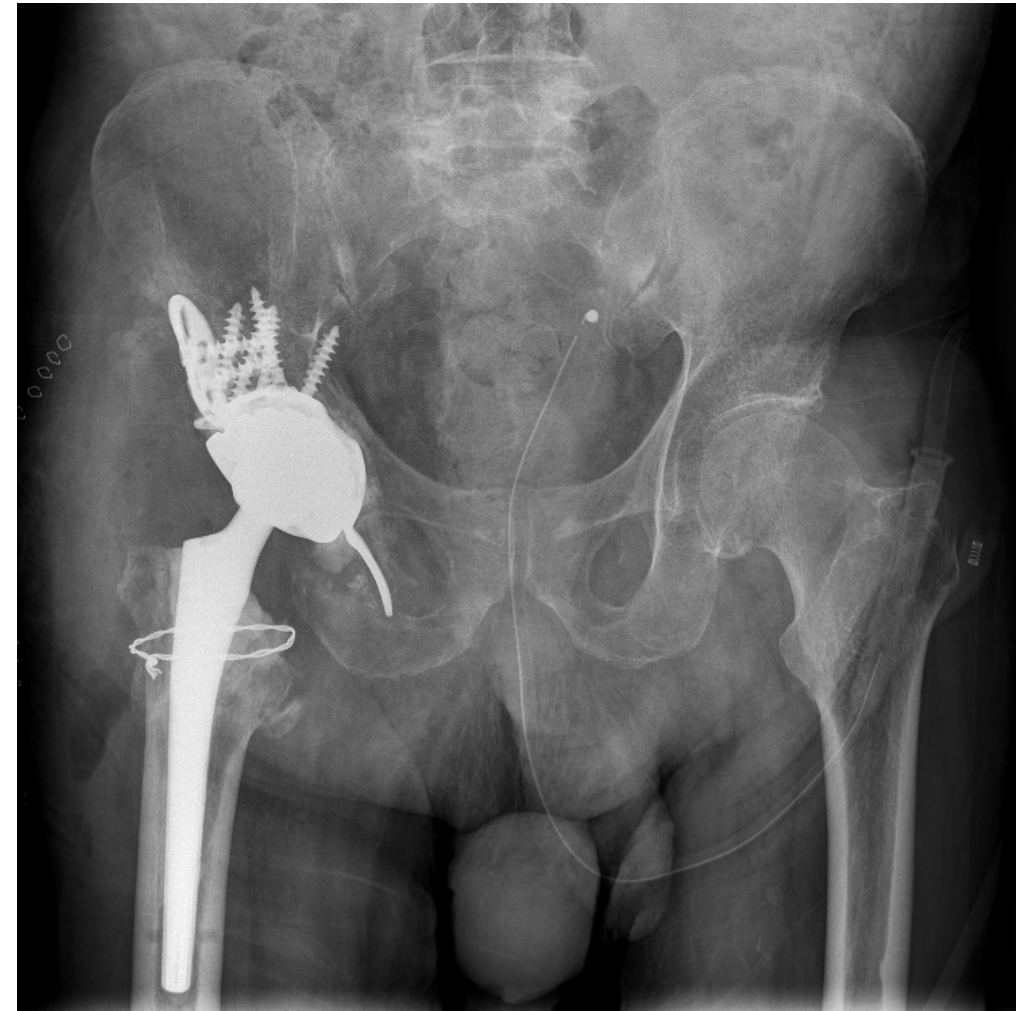




Dopo 3 settimane in riabilitazione



Riduzione incruenta, dopo 1 anno e due mesi ok



Criticità n 2: Revisioni complete vs parziali,  
tipologia di testine ed inserti utilizzati

Difference in Component Trends Between 2010 and 2018.

Type of Revision	2010	2018	OR (95% CI)	P-Value
Both components	45.4%	54.5%	1.45 (1.25-1.67)	<.001
Acetabular only	20.3%	12.7%	0.57 (0.47-0.70)	<.001
Femoral only	27.4%	30.6%	1.17 (0.99-1.37)	.014
Head/liner exchange	7%	2.1%	0.29 (0.20-0.43)	<.001

CI, confidence interval; OR, odds ratio.

Z.W. Hinton et al. / The Journal of Arthroplasty 37 (2022) S611eS615

## COTILI A DOPPIA MOBILITÀ



- ↑ Range di Movimento
- ↓ Rischio di lussazione e impingement (↑ jumping distance, ↑↑ rapporto testa/collo)
- ↓ Frizione e Usura (per doppia superficie articolare)
- Maggior impiego in **revisioni e primi impianti “difficili”** (presenza di fattori di rischio paziente-specifici)
- Rischio di **dislocazione intrapotesica** (rischio notevolmente diminuito nei nuovi design protesici)

*Ko LM, Hozack WJ. Bone Joint J. 2016 Jan;98-B(1 Suppl A):60-3.*

*Vahedi H, Makhdom AM, Parvizi J. Expert Rev Med Devices. 2017 Mar;14(3):237-243.*

184 revisioni con DM vs 111 con standard mobility

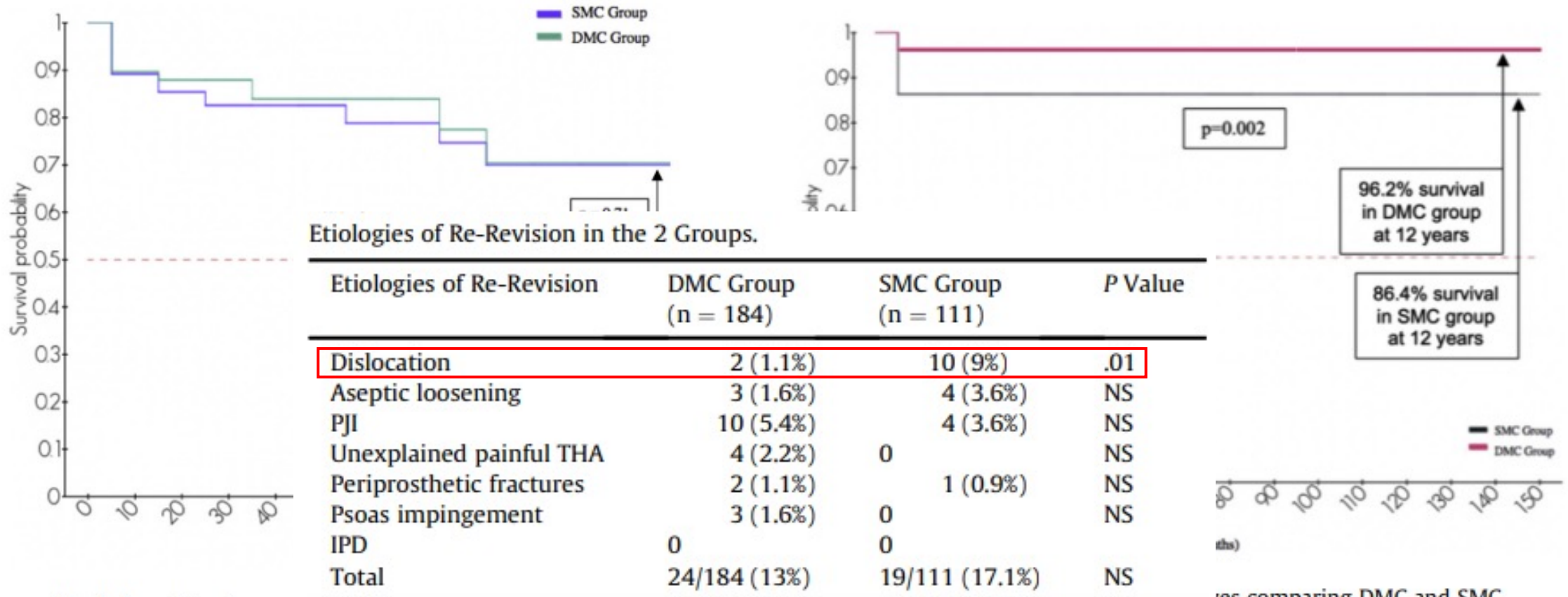


Fig. 6. Re-revision-free survival...

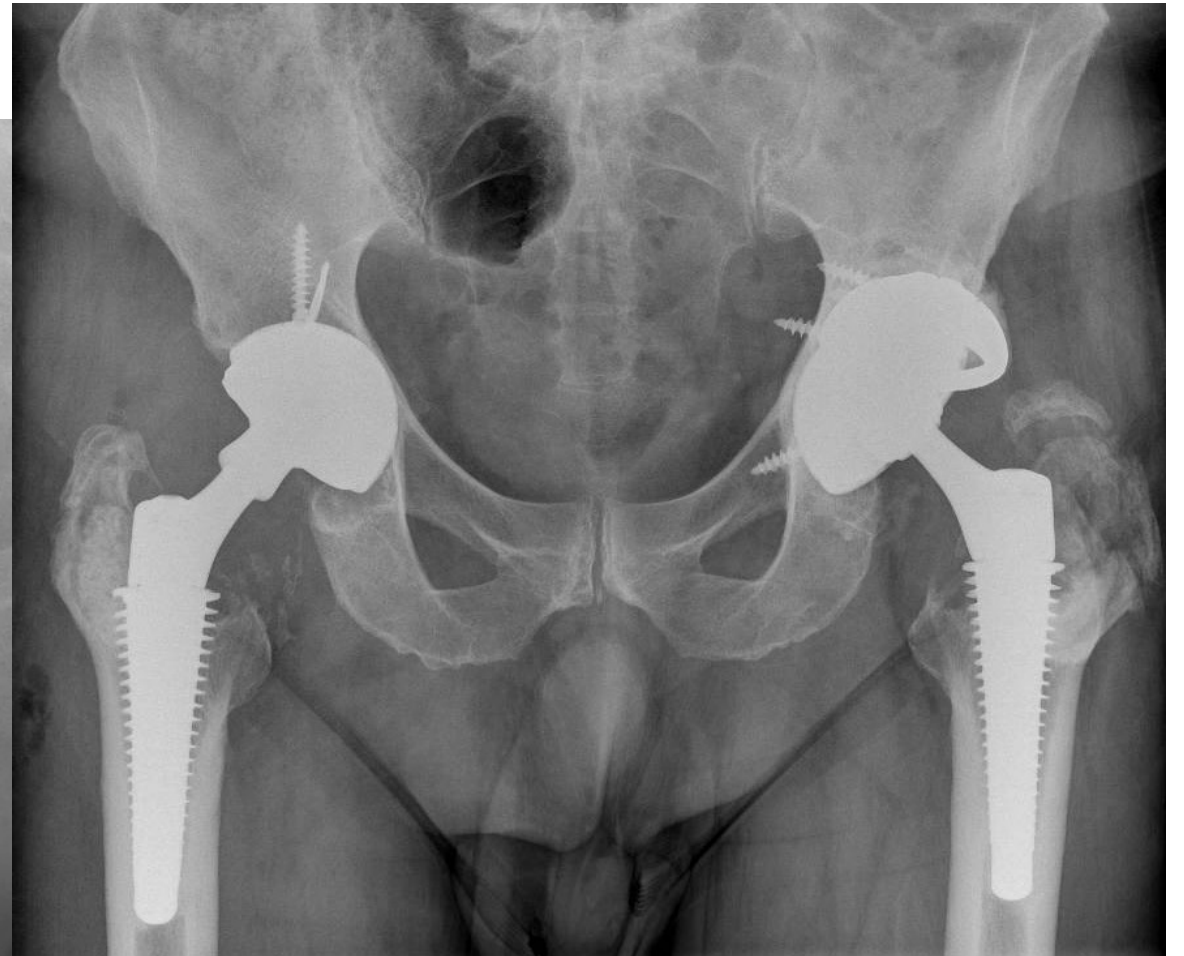
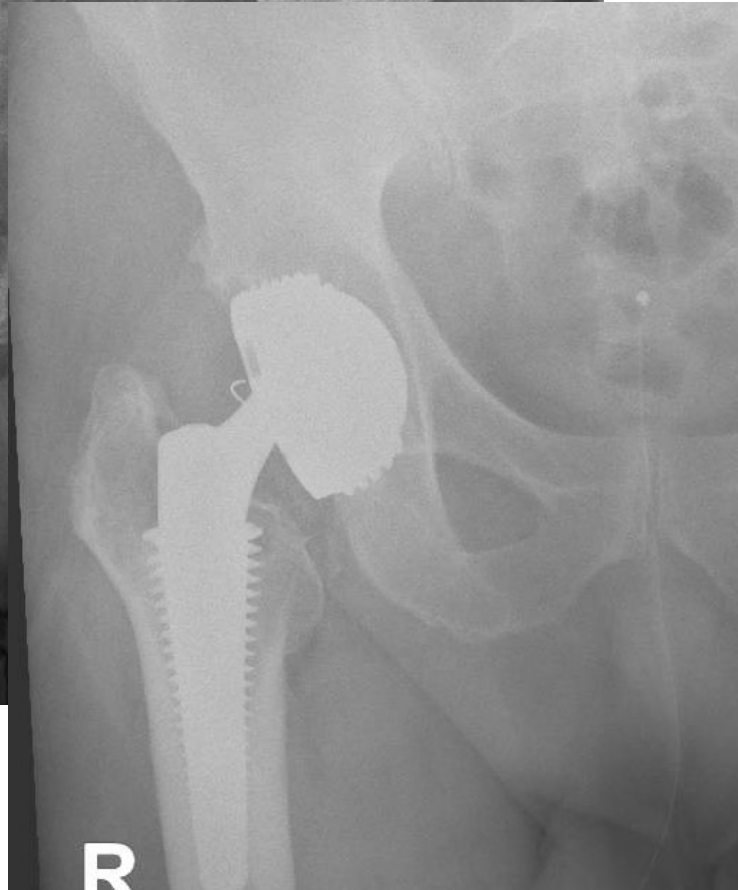
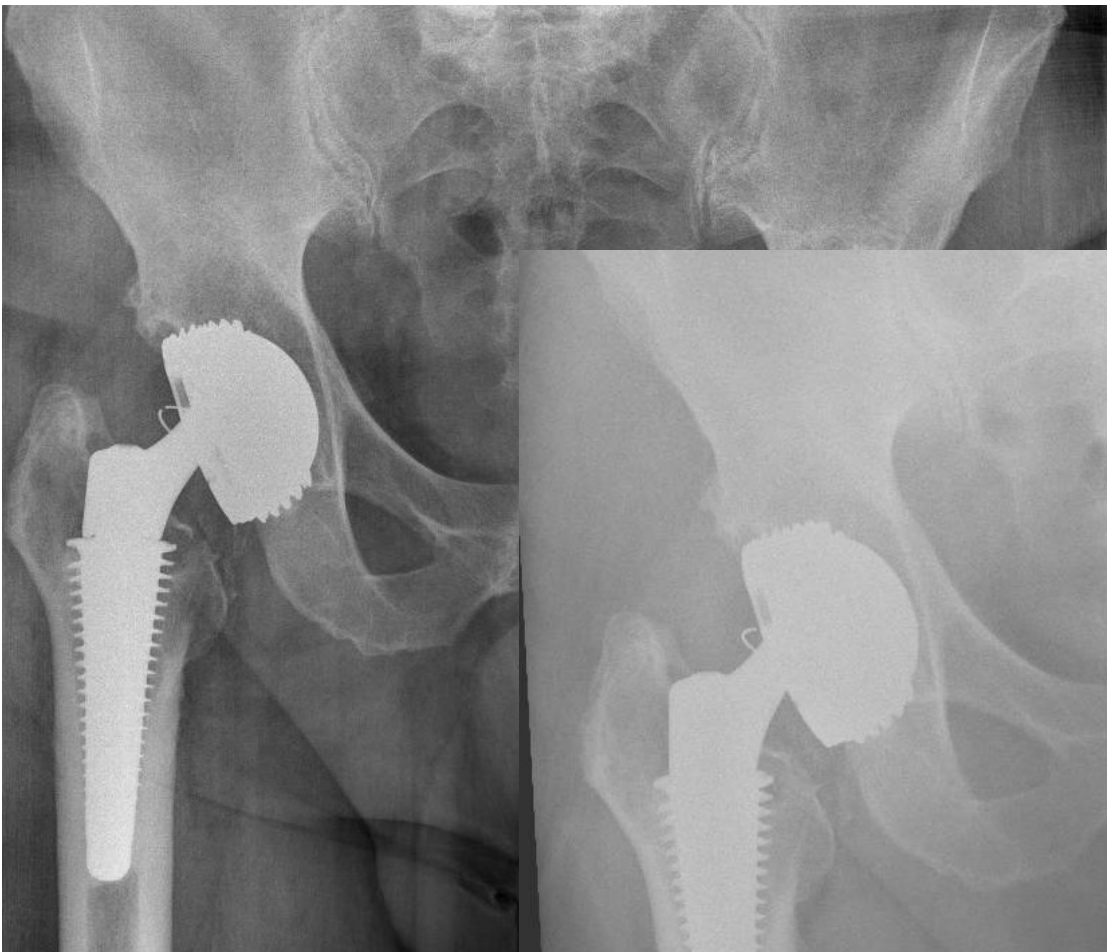
... comparing DMC and SMC.

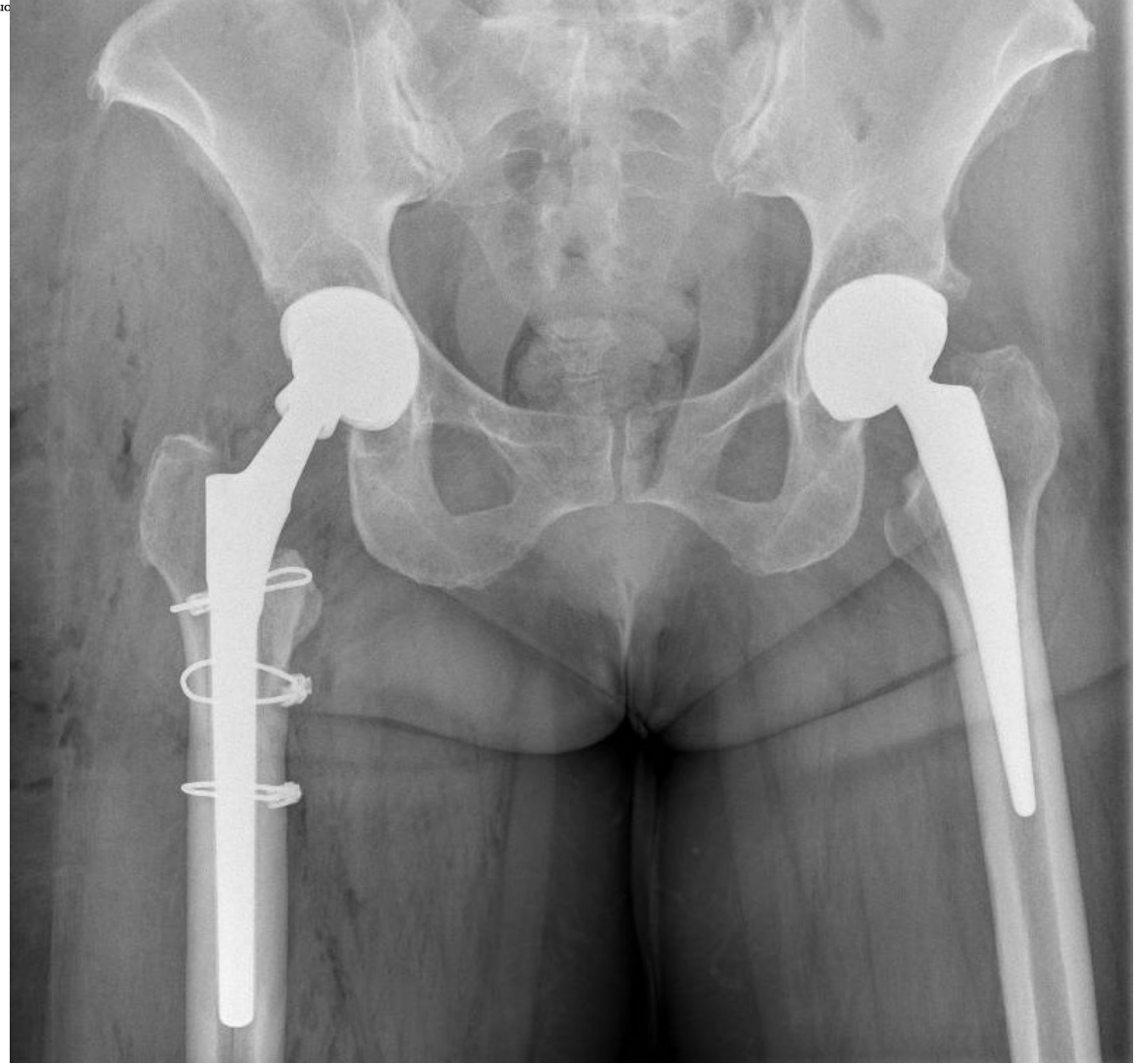
A. Schmidt et al. / The Journal of Arthroplasty 35 (2020) 500e507

## ADATTATORI MODULARI

*valida opzione (isolata o combinata ad altri trattamenti)  
per ottimizzare l'accoppiamento meccanico tra le  
componenti protesiche in termini di versione e offset.*

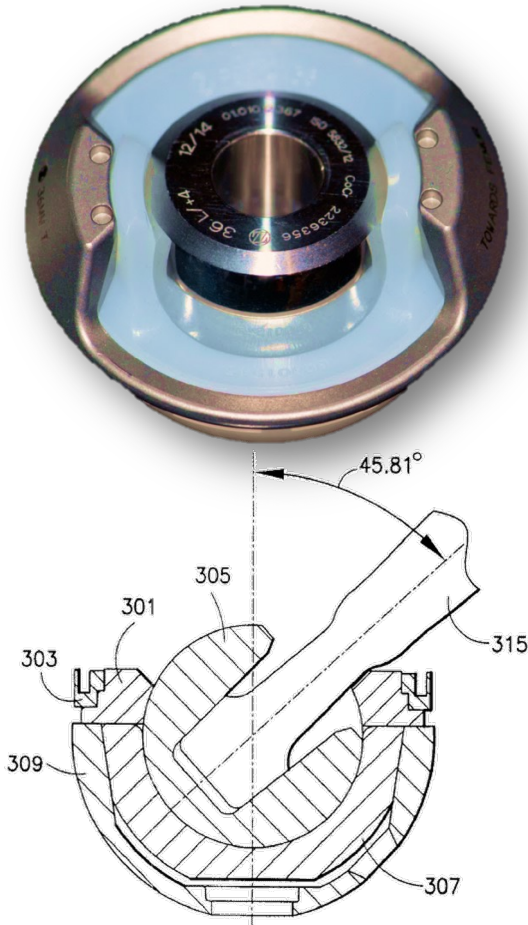








## INSERTI RITENTIVI



- Trattengono la testa femorale all'interno della coppa acetabolare grazie ad un anello metallico, conferendo una stabilità immediata.
- **Svantaggi**
  - ↑ stress di taglio, quindi ↑ rischio di mobilizzazione asettica
  - dissociazione dell'inserto
  - Fallimento/rottura dell'inserto
  - Usura del polietilene
  - ↓ Range di Movimento
  - ↑ fallimenti precoci a breve e medio termine (>30%)
- Utili come trattamento di salvataggio in lussazioni ricorrenti in pazienti con basso livello di attività e coppa stabile e osteointegrata

*Carter AH, et al. J Arthroplasty. 2011;26:46-52.*

*De Martino I, et al. Bone Joint J. 2017 Jan;99-B(ASuppl1):18-24.*




# QUANDO NON SI PUO' UTILIZZARE LA DUAL MOBILITY??

International Orthopaedics (SICOT)  
DOI 10.1007/s00264-016-3383-0



REVIEW ARTICLE

## **Total hip arthroplasty instability treatment without dual mobility cups: brief overview and experience of other options**

Luigi Zagra<sup>1</sup>  • Eleonora Caboni<sup>1</sup>

## VALUTAZIONE PREOP PIU' ACCURATA POSSIBILE!!

**Table 1** Patient information and clinical evaluation in case of THA instability

### Information and clinical investigations in case of THA instability

Occurrence, time, and way of dislocation

Comorbidities

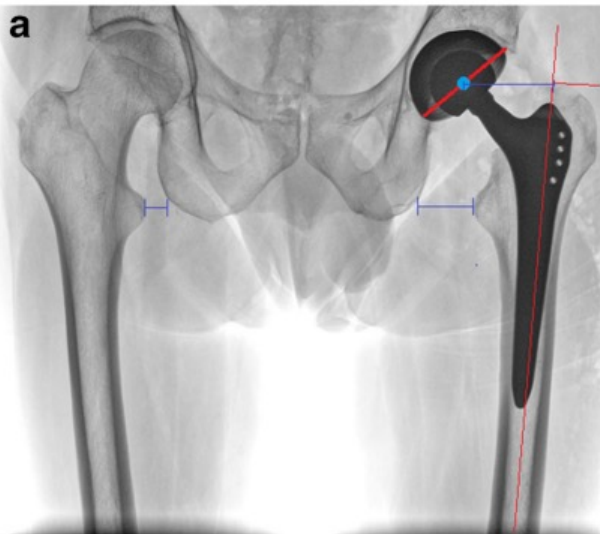
Previous surgery

Type of implant

ROM and impingement signs (“apprehension test”)

Leg length and walking capability (including limp)

Muscle function (ab muscles and Trendelenburg’s sign)



### Imaging of the unstable hip prosthesis

X-rays evaluation on pelvis AP view

CT

MRI

Relationship head-socket (concentric)

Orientation of the components (cup)

Muscle damages

Inclination of the cup

Liner damages (late dislocation)

Soft tissue reactions (metal-on-metal implants)

Height of center of rotation and off-set

Head-neck ratio

Height and integrity of the greater trochanter

Impingement signs (acetabular and femoral osteophytes, neck and liner, greater trochanter)

Zagra et al, Int Ortop 2017

**IX Congresso Nazionale A.I.R.**

Il Recupero delle geometrie articolari nelle revisioni protesiche

Verona 7-8 marzo 2024

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<ul style="list-style-type: none"><li>• Cup and/or stem revision (eventually with a bigger head)</li></ul>	Malorientation, impingement, lack of off-set, loosening, wear, soft tissues damage
<ul style="list-style-type: none"><li>• Liner and/or head exchange (eventually with bigger head)</li></ul>	Wear, impingement, lack of off-set, soft tissues damage
<ul style="list-style-type: none"><li>• Modular heads/necks/stems exchange</li></ul>	Lack of off-set, impingement, shortening (stable subsided stems), soft tissues damage
<ul style="list-style-type: none"><li>• Soft tissues treatment</li></ul>	Damage of soft tissues
<ul style="list-style-type: none"><li>• Constrained liners</li></ul>	Stable cup, low activity patient, severe soft tissues damage, failure of previous treatments

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Zagra et al, Int Ortop 2017

## CONCLUSIONI

Il danno dei tessuti molli gioca un ruolo importante nell'instabilità dopo revisione, ma non sempre un gesto riparativo è possibile o, quando è possibile, garantisce il successo

Va riconsiderata in ogni caso la revisione isolata della testa e dell'inserto

Consapevolezza di dover ottimizzare la congruenza articolare, anche a prezzo di una revisione più complessa

Uno studio preoperatorio adeguato (clinica, Rx, TC, RM) permette di scegliere la strategia operatoria migliore e garantisce un outcome finale superiore



**Università Campus Bio-Medico di Roma**  
Dipartimento di Ortopedia e Traumatologia



*Grazie !*