

Steli “corti”: stato dell’arte

E. Sabetta

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*Struttura Complessa
Ortopedia e Traumatologia
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Reggio Emilia*



SERVIZIO SANITARIO REGIONALE
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The cover features a photograph of a building at night with several illuminated, dome-shaped structures in the foreground. Below the photo is a dark blue banner with white text and logos.

4° CORSO AMIAA

**NOVITA' IN CHIRURGIA
PROTESICA DELL'ANCA**


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PROGRAMMA

15-16 settembre 2016
Fortezza Viscontea Cassano d'Adda

Steli corti



**Joint Implant Surgery & Research Foundation
Chagrin Falls, Ohio, USA**

JISRF CLASSIFICATION SYSTEM FOR SHORT STEM UNCEMENTED THA

By:

Timothy McTighe*

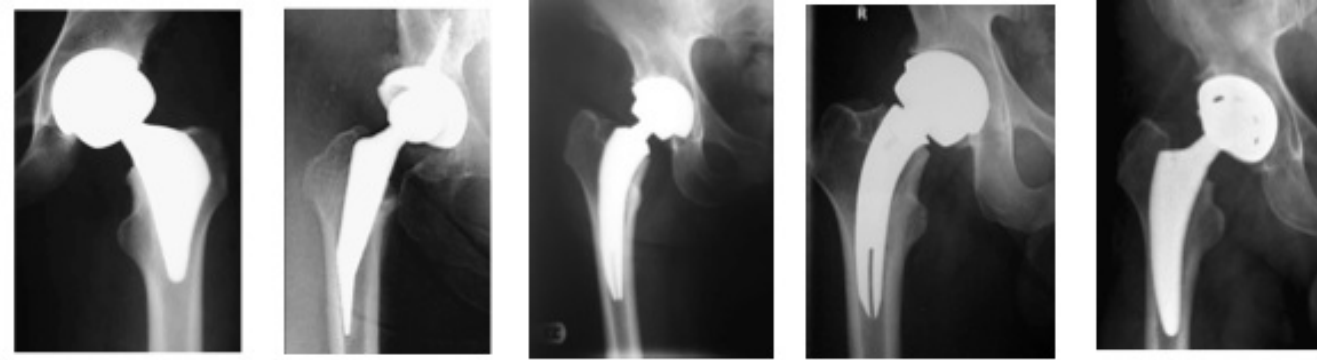
S. David Stulberg[☆], Louis Keppler[†], John Keggi[☆], Robert T. Kennon[☆],
Declan Brazil^{*.**,} Tony Aram[◇], Ed McPherson[○], & TSI[™] Study Group Members^{**}

2013

CLASSIFICAZIONE

- Lunghezza dello stelo
- Principio della fissazione

DEFINIZIONE: lunghezza ≤ 120 mm che approssimativamente corrisponde alla giunzione meta-diafisaria del femore

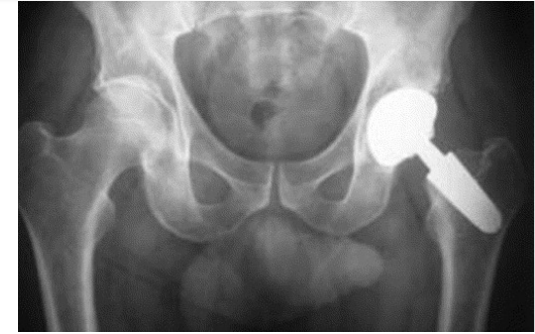
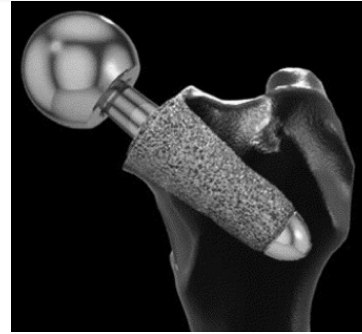


Lo stelo deve essere
lungo quanto
necessario e più
corto possibile

Feyen H, 2013

NECK STABILIZED (Plugs)

Silent Stem
DePuy
(2009)



CUT Femoral Neck modular Orthodynamics (ESKA)

- CoCrMo, struttura macroporosa, cono modulare
- Malallineamenti in varo/valgo, difetti di offset
- Alta % fallimenti (scollamento, rottura distale)



Spiron threaded Neck Plug HA coating



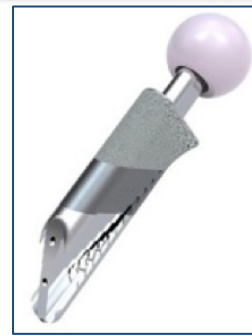
Conica
Autofilettante

Titanio-
Vanadio,

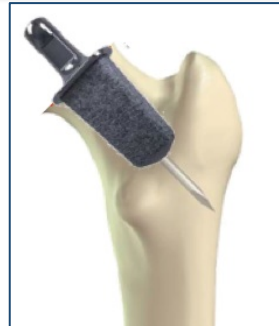
Calcio-
Fosfato



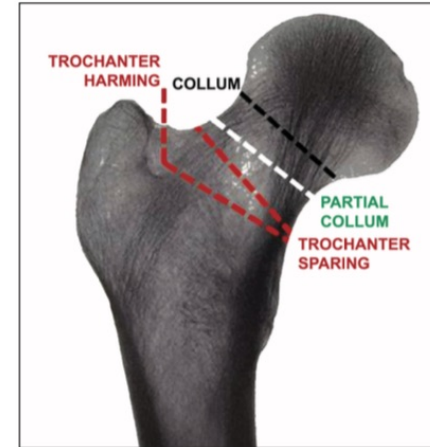
TSI Neck Plug



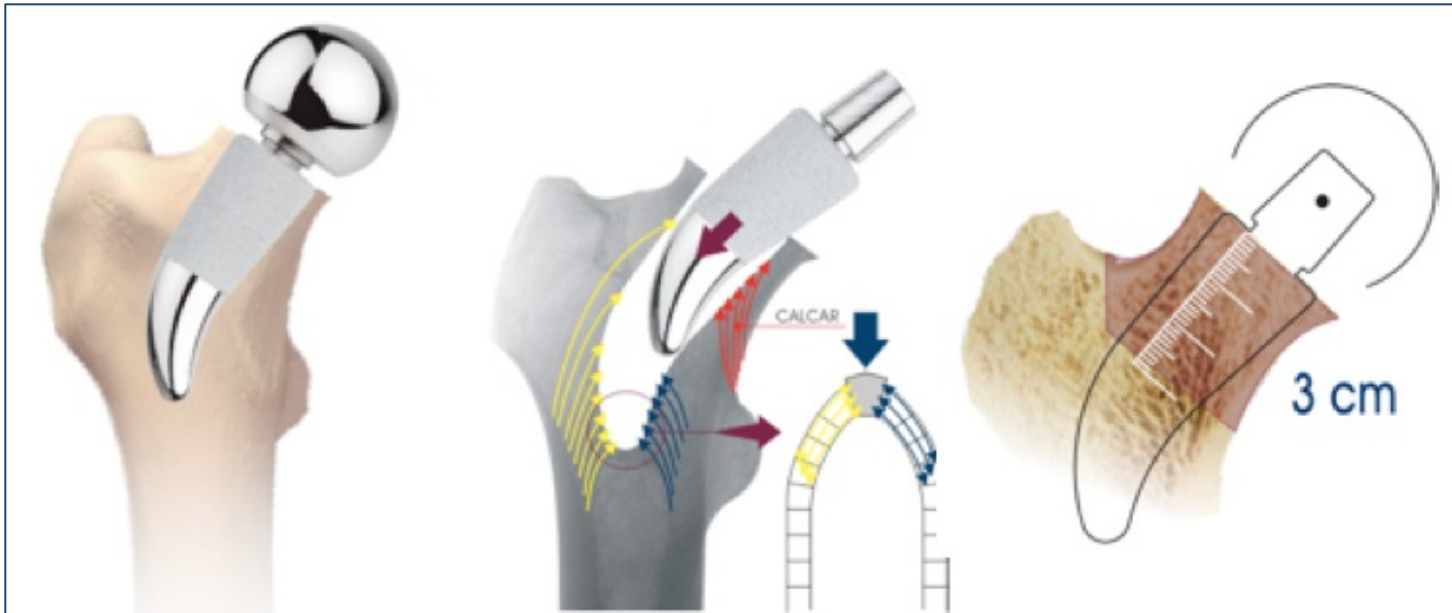
Primoris Neck Replacement Biomet



Neck stabilization



Falez F. et al, 2015



Neck stabilization



Neck stabilization

- Conservazione del collo
- Trofismo osseo del collo mantenuto rispettando alcuni rami della circonflexa mediale
- Contatto osso/protesi > 87%
- Antiversione fisiologica (14°)
- Due differenti curvature per un ottimale appoggio sulla corticale mediale
- Colletto per fisiologica distribuzione del carico sul collo

Curved Short Neck Sparing Stems



Pipino
c.c. stem implanted 1983-1996
Howmedica Biodynamic™ Stem



Pipino
CFP Titanium stem design 1996- Current
Waldemar Link

CFP

- E' una protesi corta (105-130 mm)?
- Risultato soddisfacenti a 11 aa f-up

Kendoff DO et al, 2013

- Stabilità rotatoria e resistenza all'infossamento ottime

Lazarinis S et al, 2013

- Stress shielding prossimale, specialmente in zone 7-6 Gruen

- Gillies RM et al, 2007
- Schmidt R et al, 2011
- Kress AM et al, 2012
- Lazarinis S et al, 2013

Curved Short Neck Sparing Stems

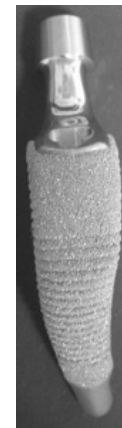
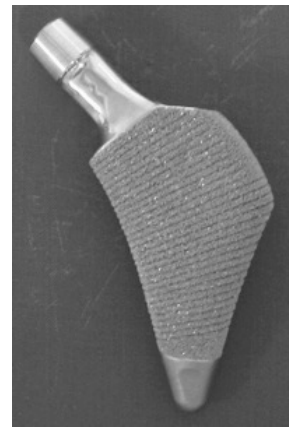


Pipino
c.c. stem implanted 1983-1996
Howmedica Biodynamic™ Stem



Pipino
CFP Titanium stem design 1996- Current
Waldemar Link

Metaphyseal stabilization



Meta

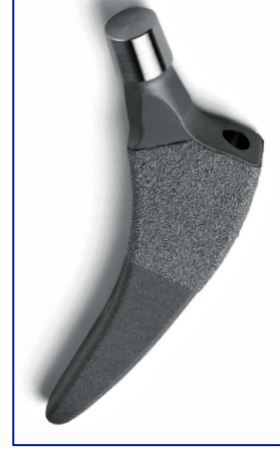
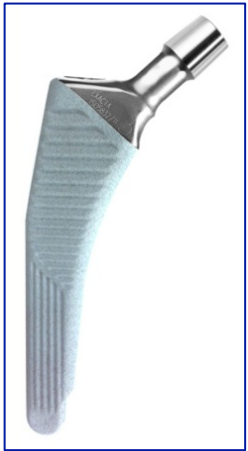
Metha: collo modulare. Fallimenti per la prima serie per rotture o disassemblaggio del collo. Il micromovimento a livello del collo modulare ha causato fallimenti (Valverde-Mordt C e Valverde-Belda D, 2012)

Steli corti

ATTENZIONE

Alcuni sono steli tradizionali accorciati: la stabilità primaria non è provata

Valverde-Mordt C e Valverde-Belda D, 2012

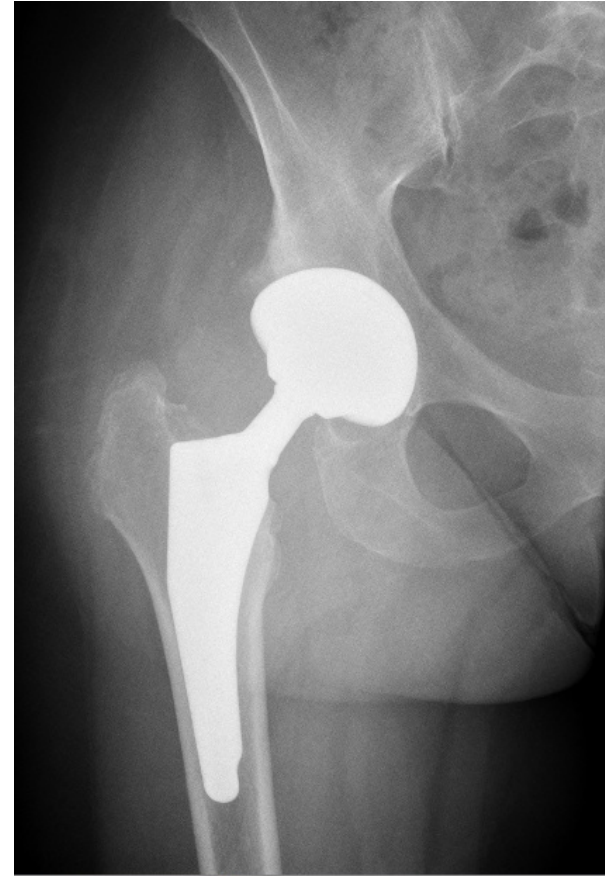
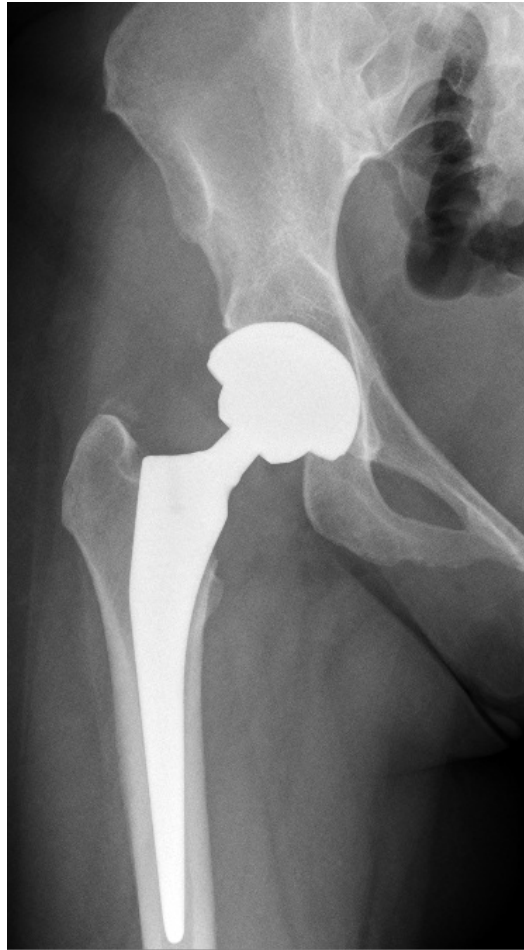


Steli tradizionali (*non cementati*)

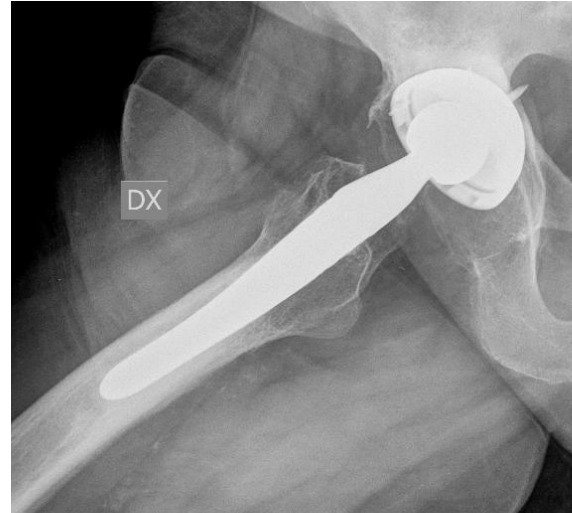
- Sacrificio osseo
- Adattamento alle differenti morfologie “intramidollari” femorali
- Stress shielding (rarefazione ossea prossimale, dolore di coscia)
- Difficoltà nella revisione



Sacrificio osseo



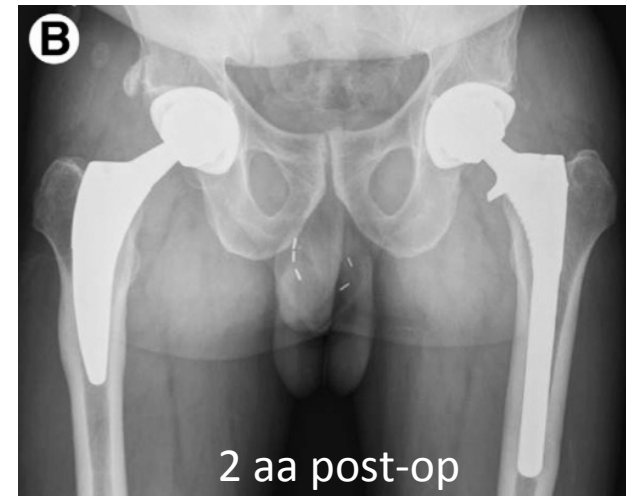
Stress shielding



Stress shielding

- Lo stress-shielding non è necessariamente un problema. Lo diventa in caso di revisione protesica (perdita ossea, rischio frattura, ancoraggio nuova protesi)

Su EP, Barrack RL, 2013



Morfologia femorale

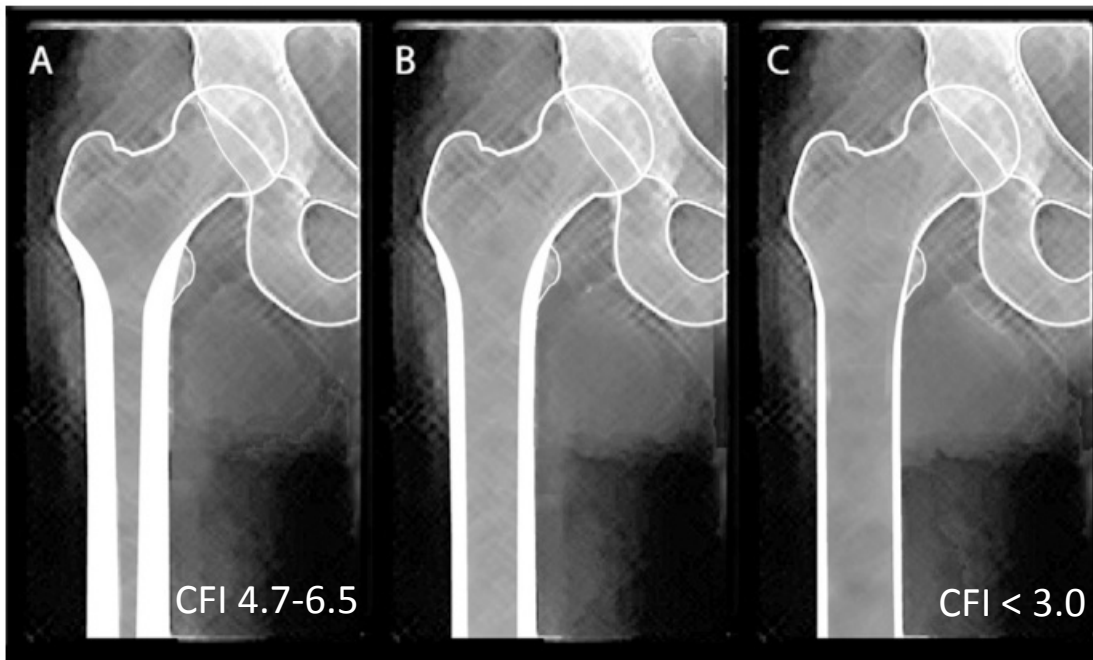
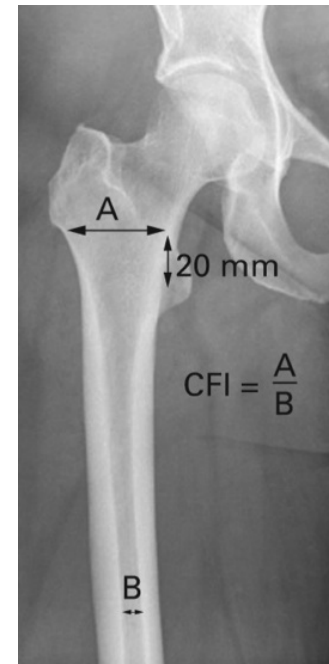


Fig. 3

Dorr classification of femoral bone quality. Dorr Type A indicates thick medial and lateral cortices and a large posterior cortex, giving a champagne-flute appearance. Dorr Type B indicates bone loss at the medial and posterior cortices. Dorr Type C indicates a stovepipe appearance due to complete loss of both the medial and the posterior cortex and a widened intramedullary diameter. (Reprinted with permission of Sinai Hospital of Baltimore, Inc., 2009.)



Canal flare index (CFI)

Feyen H e Shimmin AJ, 2014

Noble PC, Alexander JW, Lindahl LJ et al: The anatomic basis of femoral component design. Clin Orthop 235:148, 1988

VALUTAZIONE BIDIMENSIONALE!

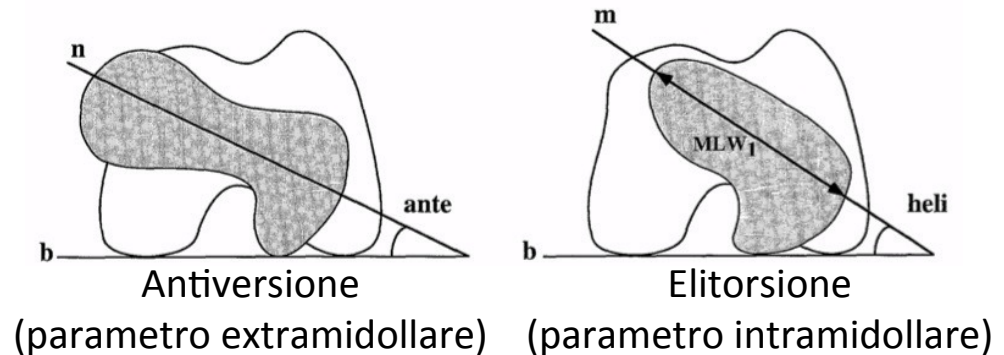
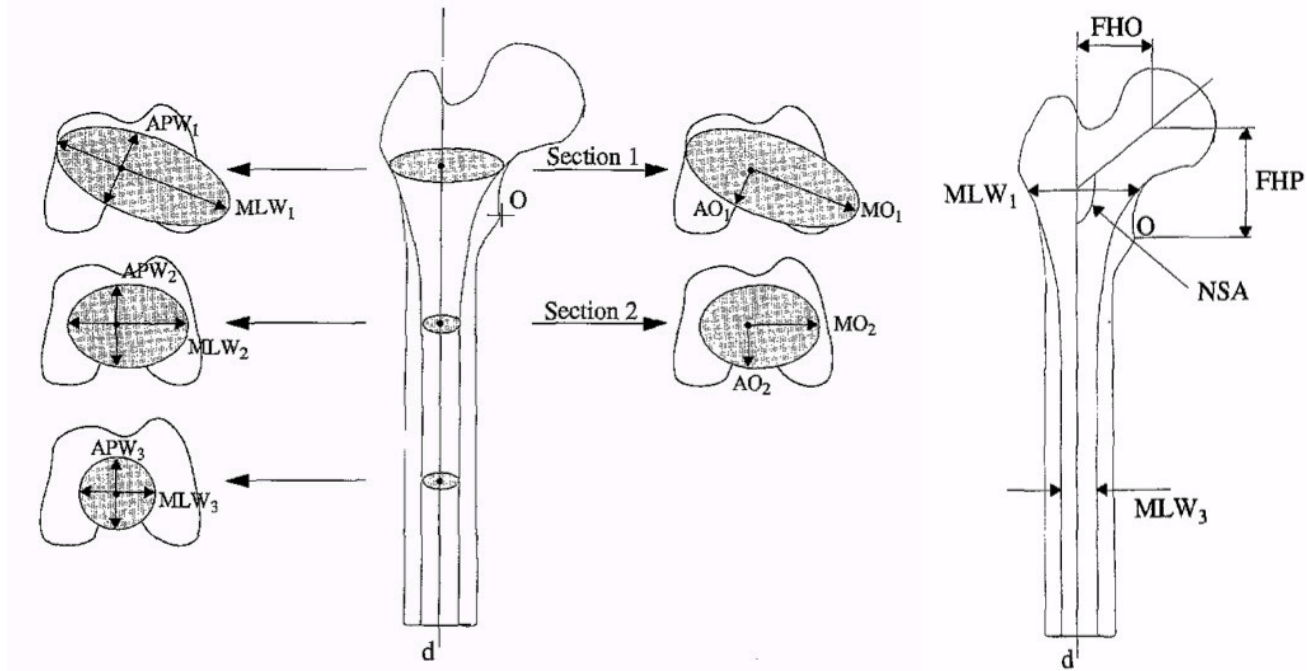
Morfologia femorale

GEOMETRIA EXTRAMIDOLLARE

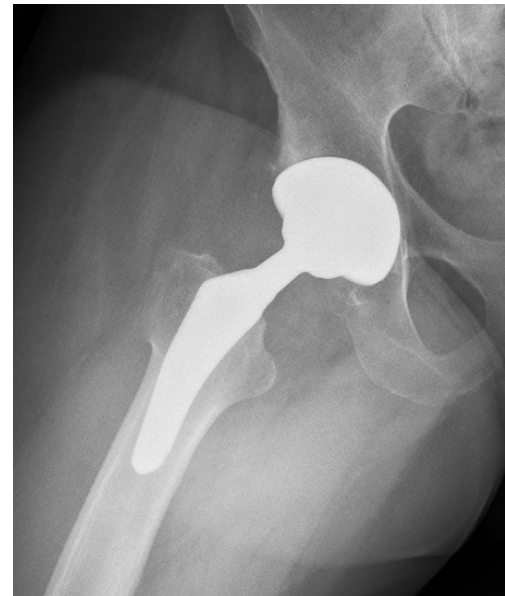
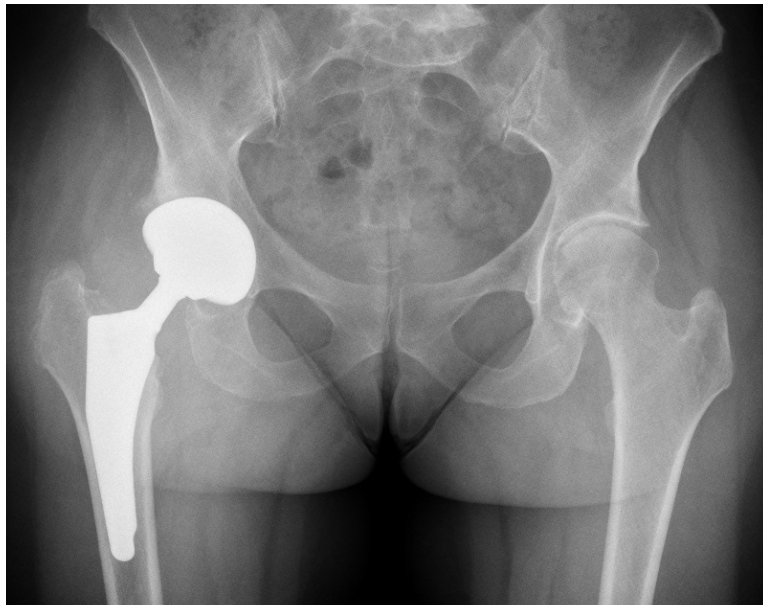
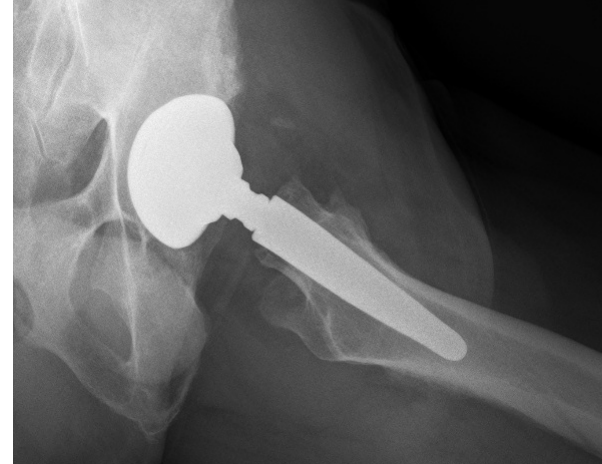
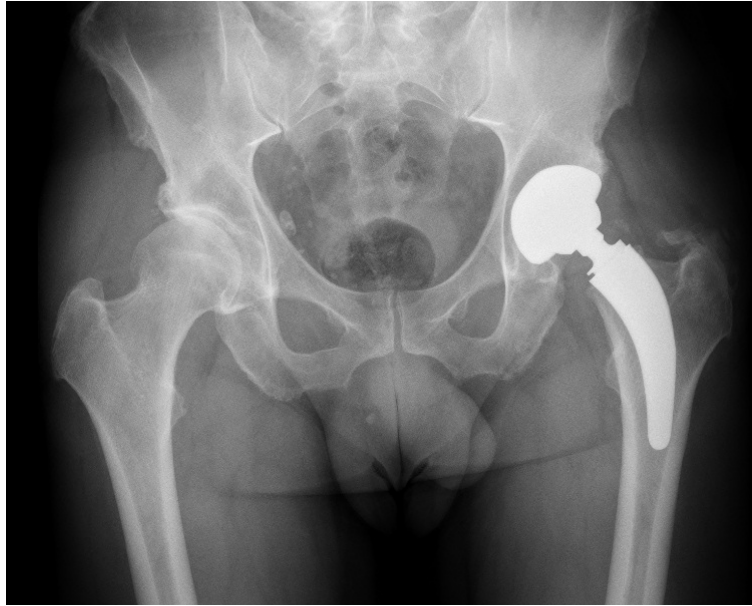
- Offset femorale
- Posizione testa femore
- Angolo CCD
- Antiversione

GEOMETRIA INTRAMIDOLLARE

- indice di svasatura del canale femorale
- indici di svasatura mediale e anteriore
- elitorsione



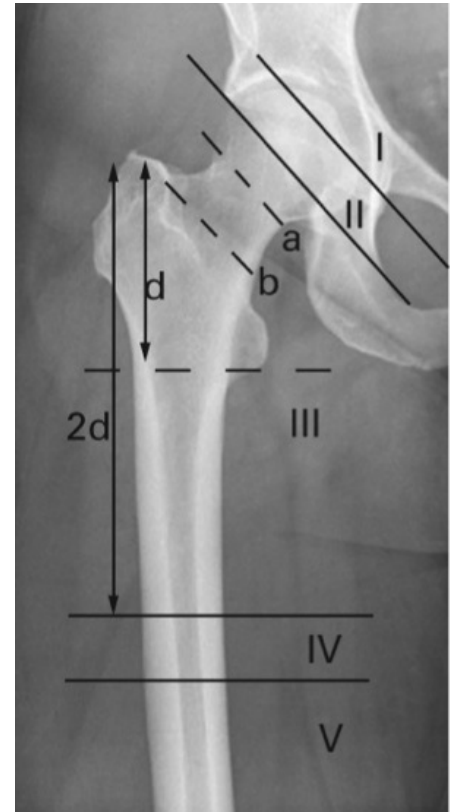
Morfologia femorale



Steli corti

LETTERATURA

- Pochi studi di elevata qualità
- La maggior parte degli studi Livello IV di evidenza
- Nessuno studio a lunga distanza
- La maggior parte degli studi ha casistica limitata (<50 casi); manca il confronto con gruppo di steli convenzionali
- Gli studi non sempre riportano accurata valutazione clinica dei risultati
- La popolazione dei pazienti non è omogenea
- Le indicazioni non sono le stesse in tutti i lavori
- Gli steli corti hanno geometrie differenti e differenti principi di fissazione

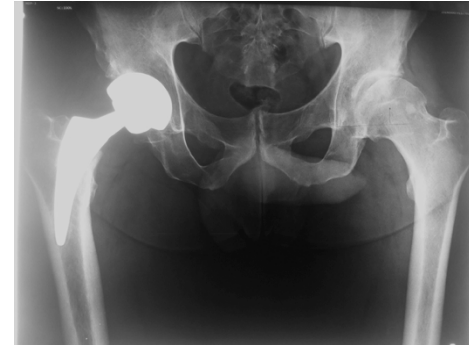


Feyen H e Shimmin AJ,
2014

Steli corti

(Vantaggi) - PROBLEMI

- Meno versatili (minore adattamento alle differenze anatomiche individuali)
 - Errori nel controllo offset
 - Malposizionamento in varo/valgo $>5^\circ$
 - Fratture intra-operatorie (0%-7%)
 - Maggiore rischio allungamento arto (Schmidutz F et al, 2012)
 - Tecnica più difficile (esposizione acetabolo) (Patel RM e Stulberg SD, 2013)
 - Maggiore rischio conflitto osseo (Patel RM e Stulberg SD, 2013)
 - Ridotta stabilità primaria → micromovimento → ostacolata osteointegrazione → rischio scollamento asettico (Ong KL et al, 2009; van Rietbergen B et al, 2001)
 - Carico completo ritardato
 - Affondamento (0%-7%)
 - Dolore di coscia (0%-2.7%)
 - Stress shielding (5%)
- Gilbert RE et al, 2009
 - Banerjee S et al, 2013
 - Ender SA et al, 2007
 - Niggemeyer O et al, 2010
 - Banerjee S et al, 2013
 - Ghera S e Pavan L, 2009
 - Kim YH et al, 2013
 - Santori FS e Santori N, 2010



Steli corti

INDICAZIONI

- Pazienti giovani (<60 aa), attivi con controindicazione all'impianto di una protesi di rivestimento
Cruz-Vázquez et al, 2011
Goebel D e Schultz W, 2009
- Età <70 aa Gruner et al, 2015
- Artrosi primaria
- Displasia
- Necrosi
- Indicati anche in osso osteoporotico e morfologia tipo C di Dorr (spec. steli con flangia laterale)
Kim YH et al, 2011
Kim YH et al, 2013

CONTRO-INDICAZIONI

- Osteoporosi
 - visibile su RX
 - DXA T-Score <2.5 } Jahnke et al, 2014
- indice corticale <3
Morales de Cano JJ et al, 2013
- valutazione intra-op
Gruner et al, 2015
- Varo <115°
- Valgo >150°
- Coxa antetorta (>35°)
- Colli femorali molto larghi e corti → insufficiente "fit and fill" della protesi

Steli corti e accessi mini-invasivi

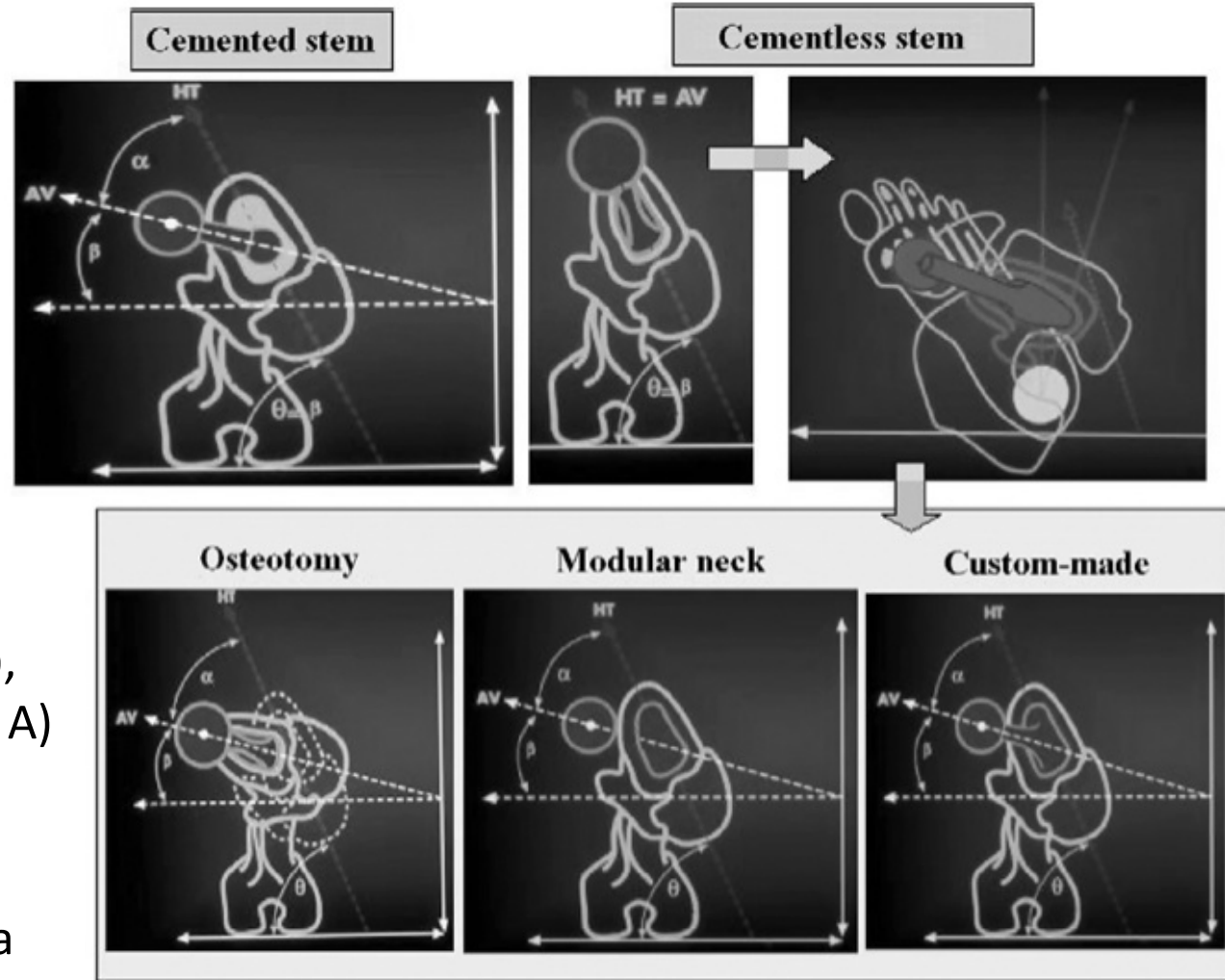
Revisione di 142 studi, 72 esclusi perché insufficienti, 70 considerati

Solo in 6 studi su 70 sono stati utilizzati accessi mini-invasivi per l'impianto di steli corti

Khanuja et al, 2015

Planning preoperatorio

- Cilindrici (tipo 3 B)
- Cementati
- Colli modulari
- Cilindrici (tipo 4)
- Single wedge (tipo 1)
- Rettangolari (tipo 3 C)
- Double wedge (tipo 2),
Tapered round (tipo 3 A)
- Anatomici
- Corti presa metafisaria
- Corti presa nel collo



Tecnica chirurgica

Steli a risparmio di collo



“STEM FIRST”



Carico post-operatorio

Revisione di 142 studi, 72 esclusi perché insufficienti, 70 considerati

52% degli studi (48) → *carico parziale*

31% degli studi → *carico totale*

Khanuja et al, 2015

CURRENT CONCEPTS REVIEW

Short Bone-Conserving Stems in Cementless Hip Arthroplasty

Harpal S. Khanuja, MD, Samik Banerjee, MS(Orth), MRCS(Glasg), Deepak Jain, MS(Orth), Robert Pivec, MD, and Michael A. Mont, MD

Investigation performed at the Department of Orthopaedic Surgery, Johns Hopkins University School of Medicine, Baltimore, and the Rubin Institute for Advanced Orthopedics, Center for Joint Preservation and Replacement, Sinai Hospital of Baltimore, Baltimore, Maryland

- ▶ Short bone-conserving femoral stems in total hip arthroplasty were designed to preserve proximal bone stock.
- ▶ Given the distinct fixation principles and location of loading among these bone-conserving stems, a classification system is essential to compare clinical outcomes.
- ▶ Due to the low quality of currently available evidence, only a weak recommendation can be provided for clinical usage of certain stem designs, while some other designs cannot be recommended at this time.
- ▶ A high prevalence of stem malalignment, incorrect sizing, subsidence, and intraoperative fractures has been reported in a subset of these short stem designs.
- ▶ Stronger evidence, including prospective multicenter randomized trials comparing standard stems with these newer designs, is necessary before widespread use can be recommended.

TABLE II Grades of Recommendation*

Grade	Description
A	Good evidence (Level-I studies with consistent findings) for or against recommending intervention.
B	Fair evidence (Level-II or III studies with consistent findings) for or against recommending intervention.
C	Conflicting or poor-quality evidence (Level-IV or V studies) not allowing a recommendation for or against intervention.
I	There is insufficient evidence to make a recommendation.

*Adapted from Wright et al.¹¹⁴.

TABLE III Recommendations for Use of Short Bone-Conserving Designs

Grade*	Recommendation
I	For Types-1A, 1B, and 1C; Type-2A designs used by Ettinger et al. ²³ ; Type-2C designs; and Types 3 and 4, there is lack of evidence to recommended routine use at present.
C	For the Type-2A design used by Wittenberg et al. ⁵⁵ , because of conflicting evidence in literature, only a weak recommendation can be made for its use.
C	For the Type-2A design used by Morrey et al. ²⁹ and others ^{30,59-63} and the Type-2B design used by Kendoff et al. ⁶⁴ and others ^{27,28,65-75} , a weak recommendation can be made for its use.
C	For Type-2D stems used by Ishaque et al. ⁸³ and others ^{48,83-92,94-98} , there is weak recommendation against use at present.

*Grades are based on the system described by Wright et al.¹¹⁴.

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GRADO I: non raccomandati per uso routinario

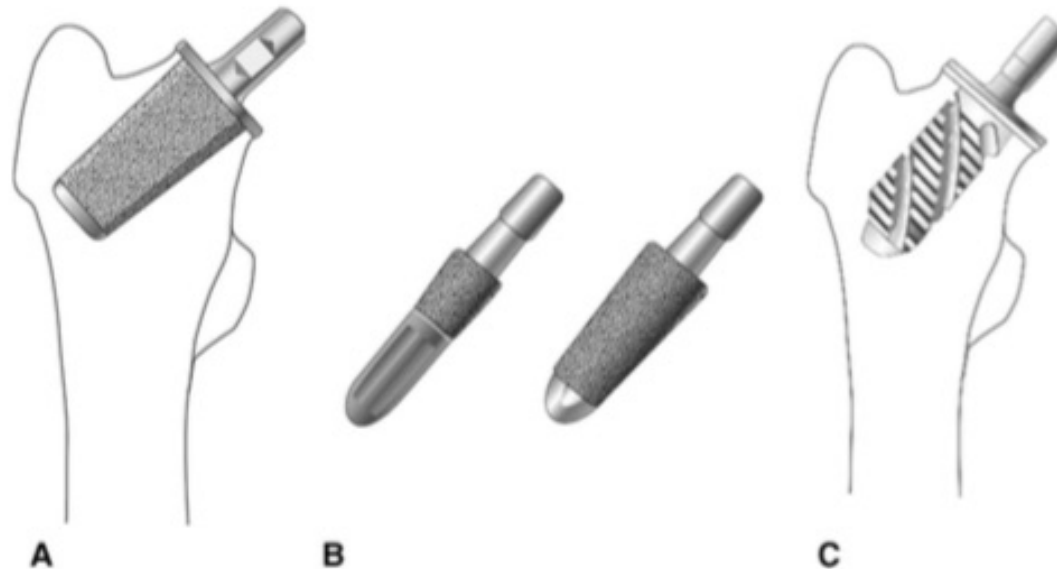


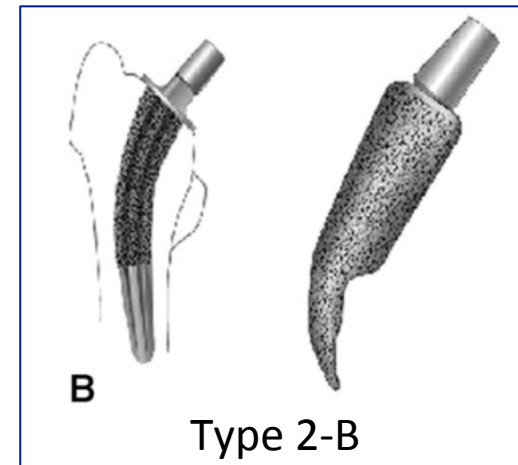
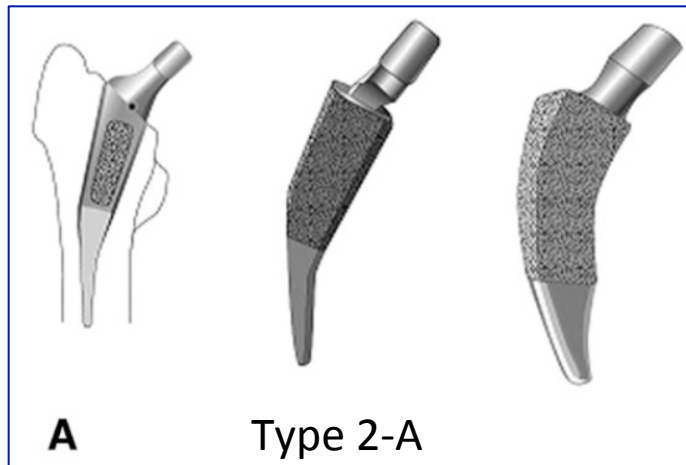
Fig. 1

Figs. 1-A, 1-B, and 1-C Type-1 stems. **Fig. 1-A** Type-1A neck-only prosthesis with a trapezoidal cross section. **Fig. 1-B** Type-1B neck-only prosthesis; the rounded stem geometry has splines for rotational stability. **Fig. 1-C** Type-1C neck-only prosthesis with threaded geometry for rotational stability.

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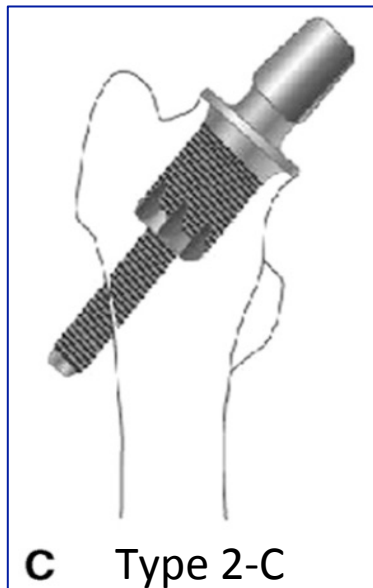
- GRADO I: non raccomandati per uso routinario (Ettinger et al. 2011)
- GRADO C: debole raccomandazione per l'uso (Wittenberg et al. 2013)
- GRADO C: debole raccomandazione per l'uso (Morrey et al 2000 + Falez et al. 2008 + Gagala et al. 2009 + Cruz-Vázquez et al 2011)

GRADO C: debole raccomandazione per l'uso (Kendoff et al. 2013 + Pipino et al. 2000 + Nowak et al. 2011 + Ghera et al. 2013 + Pipino 2004)

TABLE II Grades of Recommendation*

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GRADO I: non raccomandati per uso routinario

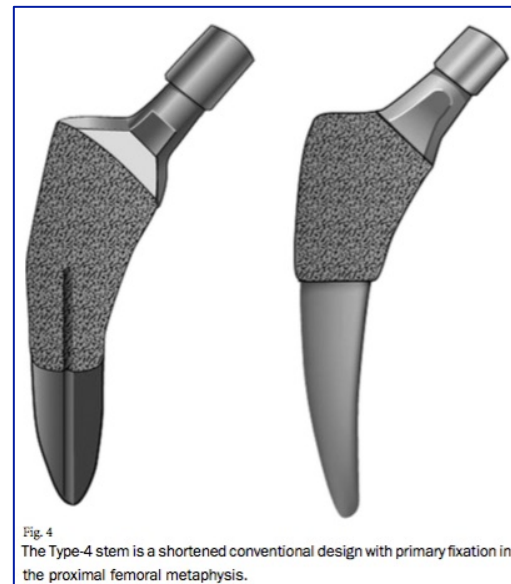
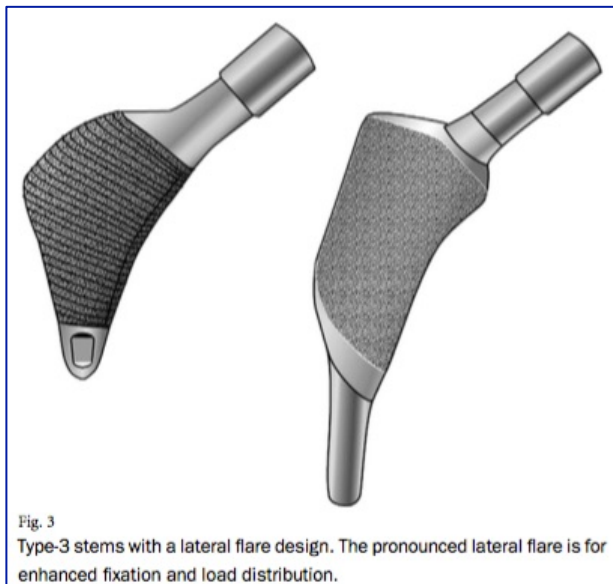
GRADO C: debole raccomandazione per l'uso

TABLE II Grades of Recommendation*

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I	There is insufficient evidence to make a recommendation.

*Adapted from Wright et al.¹¹⁴.

GRADO I: non raccomandati per uso routinario





Original Article

Periprosthetic Bone Remodeling After Novel Short-Stem Neck-Sparing Total Hip Arthroplasty

Phong Tran, MBBS, FRACS, FAOrthA^{*}, Benny X. Zhang, MBBS, BMedSci, Justin A. Lade, MBBS, FRACS, FAOrthA, Robert M. Pianta, MBBS, FRACS, FAOrthA, Raghavan P. Unni, MBMS, FRACS, FAOrthA, Chris S. Haw, BSC, MBChB, FRCS(Ed)

Department of Orthopaedic Surgery, Footscray Hospital, Western Health, Footscray, Victoria, Australia

Conclusion

The MSA THA system is a novel femoral stem prosthesis that has the capacity to address the stress-shielding problem identified in femoral stems. However, the high early revision rate is a significant issue, which is an issue for many other short-stem prostheses currently available. Adequate research and independent evaluation should be encouraged before new prosthetic stems become commercially available, especially in a climate where there are numerous prostheses with excellent long-term survivorship data.

GRAZIE

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