Long term outcome of Primary T.H.A. with Cementless Gritblasted Components

L. Spotorno*, M.D., G. Grappiolo*, M.D., J.D. Blah°, M.D., B.L. Penenberg#, M.D., G. Burastero*, M.D., T.A. Gruen°, M.D.

*Dept. of Hip Surgery - S. Corona Hospital - Pietra L. (SV), Italy °Dept. of Orthopedic Surgery - Health Sciences Center South - Morgantown, WV #Dept. of Hip Surgery - Cedars-Sinai Medical Center - LA, California

Survey

Dec. 1984 - Dec 1987

290 Patients

Male: 131, Female: 159

Avg age: 54.8 yrs (22 - 73 yrs)

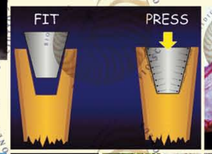
305 Consecutives THA

Avg Follow-up **13.2 yrs**

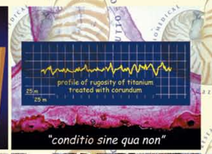
Survivorship analysys - CLS SYSTEM

Research of primary stability and subsequent osteointegration is the most important and common goal in cementless prosthesis

"Press-fit" stability



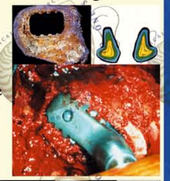
Osteophilic Rough Surface



"conditio sine qua non"

Shape and anchorage

Evolutive high potentiality and functional adaptation of the metaepiphysary "mechanical" cancellous bone

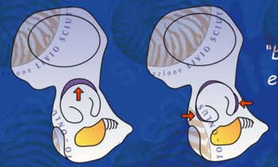


Since December 1983 the CLS femoral prosthesis has had no major design changes

Life - expectancy of cementless acetabular component is linked to:

A) Stability
B) Osseointegration
C) Biotrophysm

Mueller Foundation Study



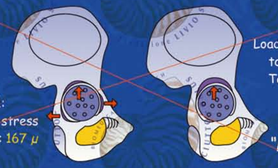
Phase 1: Compressive ileum deformation: 156 μ

Phase 2: Load transfer from ileum to pubis and ischium: 127 μ

Concepts behind shapes

In order to obtain good long term results, a cup should respect acetabular kinetics

A rigid implant stiffen the bone implant system and produce ileum overload



Phase 1: Compressive stress deformation: 167 μ

Phase 2: Load transfer from ileum to pubis and ischium Tensive stress: 83 μ

loss of "braking effect"

Stability & press-fit

Primary stability in expansion cup is guaranteed with press-fit and cancellous teeth

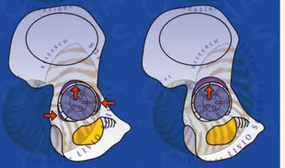
Biotrofism

Acetabulum + Expansion Cup

Deformation of periacetabular region

a.i.i.s. - iliopubic ramus compressive stress: 153 μ

iliopubic/ischiopubic ramus compressive stress: 125 μ



Osteointegration

Mechanical factors

stable compressive strenghts

Material

corundum rough blasted titanium alloy

First Generation 1975-1980 Cementless Femoral Prosthesis

Implant features

Stiffness

- Modulus of Elasticity
- Titanium Alloy
- Stem Length

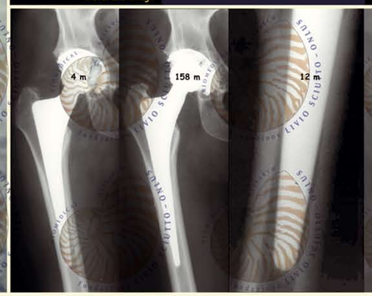
Shape

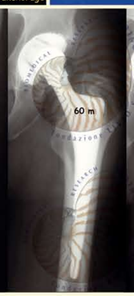
- Tight Distal Stem
- Canal Filling
- Collarless
- Straighten Stem
- 3-D Wedge Shape
- Undersized Distal Stem

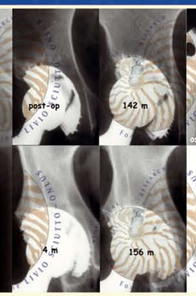
Surface

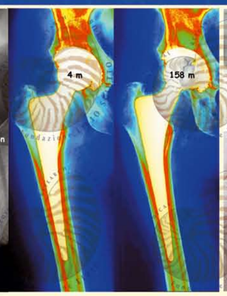
- Macrostructure: distal bone ingrowth
- Corundum Rough blasted Finish

CLS Stem Characteristics









Introduction

The purpose of this study was to evaluate the long-term results of THA with cementless, gritblasted, press-fit femoral and acetabular components.

Methods

290 patients with 305 consecutive primary THA were evaluated with an average follow-up of 13.2yrs (11.4-15.2yrs). The femoral component was a collarless, gritblasted, tapered, straight stem. The acetabular component was a gritblasted metal-backed expansion socket.

Results

In total 15 patients (5%) were lost to follow-up; 9 patients (3%) had follow-up less than 10 years, and 39 (13%) died. The overall revision rate was 10% (29 patients). Both components were revised in 3 patients (1%): 1 sepsis, 1 debris-related osteolysis, and 1 for post-traumatic dislocation. The acetabular only revision rate was 8% (26 patients): recurrent dislocation in 5 cases, osteolysis in 5 cases(one with subsequent shell breakage), aseptic loosening in 11 cases (ten with subsequent shell breakage), wear in zone I in 3 cases (3 with subsequent shell breakage). The remaining 2 cases were 1 with mismatched head (32 mm head/28 mm liner) and 1 for insert replacement due to wear.

Radiographic evaluation, by an independent observer, of 215 hips with 10-year minimum follow-up showed: measurable subsidence in 6 cases (3%), stable, osseointegrated stems in 167 (78%) hips with intact femoral interfaces, and femoral osteolytic lesions in 39 hips (18%). Ten-year survivorship of the entire series using any revision as endpoint was 93.3% and 98.6% for stem revision.

Discussion / Conclusion

A high survivorship rate of femoral implants was noted; the failure rate of the acetabular component, strongly related to osteolysis, is lower than other uncemented sockets with similar follow-up. Concomitant shell breakage is emphasized by the fact that the first generation of this socket was made from pure titanium, which is considerably weaker than the titanium alloy in use since 1990.