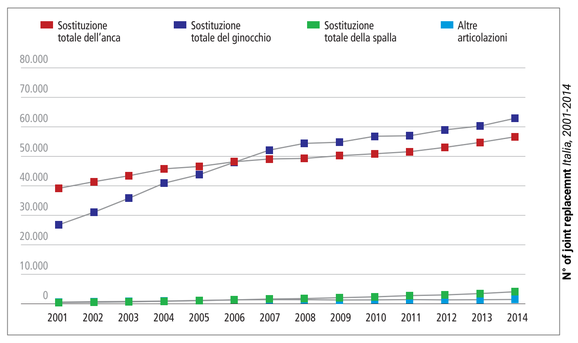
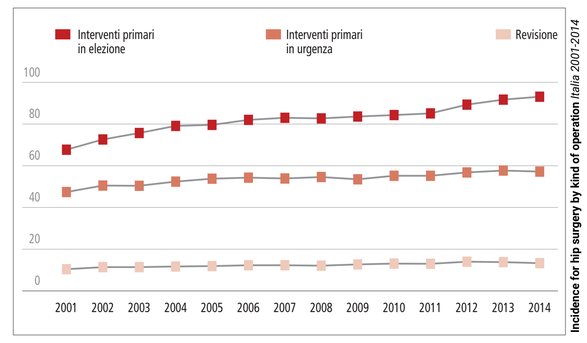
Etiology And Management Of Total Hip Arthroplasty Dislocation: A Retrospective Cohort Study In A Tertiary Referral Centre.

Mattia Loppini[1], Giuseppe Salvatore[2], Riccardo Ruggeri[3],Francesco Traverso[3], Federico Della Rocca[3], Giuseppe Mazziotta[3], Giuseppe Santoro[3], Franco Astore[3], Guido Grappiolo[3]

1. *Humanitas University, Milan, Italy*
2. *Campus Bio-Medico University, Rome, Italy*
3. *Humanitas Clinical and Research Center, Milan, Italy*

Total Hip Arthroplasty is one of the most successful surgical procedure of the past century and numbers are increasing every year, due to life expectation improvement and these growing also revision surgery is becoming more frequent. Complications after surgery are between 2% - 10% and include: early mobilization, infection and dislocation. Postoperative dislocation is a challenging complication after primary and revision of total hip arthroplasty (THA) that affects patient outcome worldwide. Recent studies report an incidence of 1,9% after primary THA, the 60% are within 5 weeks after surgery. Instability is one of the more common complications, and usually it happens within the first year after surgery.





ENDPOINTS

The primary endpoint:

- to describe the biomechanical cause of instability in patients affected by dislocation after primary and revision THA

The secondary endpoint:

- to assess the recurrence of dislocation after revision surgery, taking into account the number of previous surgeries and surgical procedure used for the management of dislocation.

INCLUSION CRITERIA

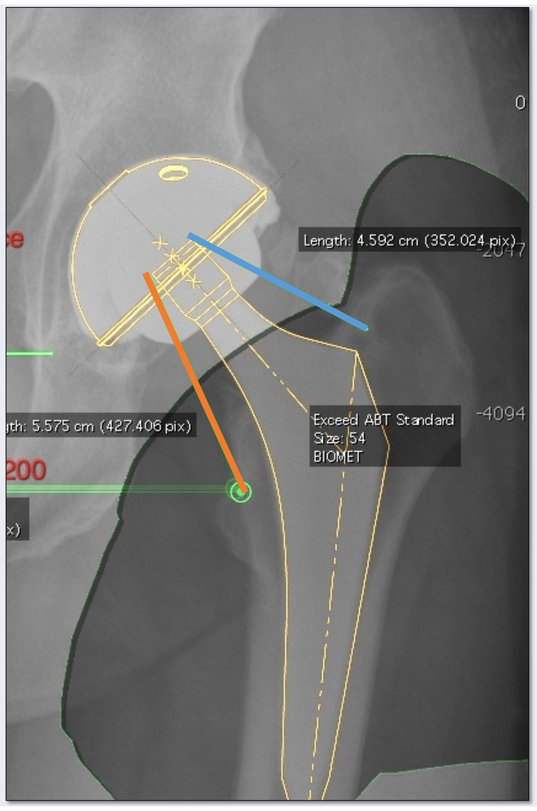
- Any patient undergoing hip revision surgery for recurrent dislocation (at least 2) between February 2008 and March 2017

EXCLUSION CRITERIA

- dislocation due to loosening of the prosthesis
- dislocation due to periprosthetic fracture
- patients with postoperative follow-up less than 6 months.

Vertical offset **orange** line: distance from center of rotation to the lesser trochanter

Lateral offset **blue** line: distance from the center of rotation to the fossa piriformis



METHOD

For each patient, data from clinical and surgical records were extracted including demographics, number of previous surgeries, time from primary or revision THA and dislocation, mechanism of dislocation, abductor deficiency, orientation of cup and stem. The recurrence of dislocation after revision surgery was also recorded. X ray analysis has been conducted on pre and post operation images, in case of cup revision we have calculated the cup's antiversion and as well as lateral and vertical femoral offset (distance between center of rotation and piriformis fossa or lesser trochanter). From medical records we collected data about: the number of previous operations on the same side, the time lag between surgery and the first episode of dislocation, the direction of dislocation and the number of dislocations that occurred before the surgical revision. Patients were individually contacted by telephone to assess: correctness of data collected, stability of the new prosthetic construct and asking consent to the use of the data purpose of the study.

RESULTS

163 eligible patients, 38 were excluded for exclusion criteria and 51 were lost to follow-up leading to **74 patients** (74 hips).

Forty-five (47.3%) patients had dislocation after primary THA (group 1) and 49 (52.7%) after revision surgery (group 2). Dislocation onset within 6 months after surgery in 75% of patients without difference between the two groups. **Causes of dislocation**, isolated or combined, were:

- inadequate placement of cup and/or stem (group 1: 74.3%, group 2: 66.7%)
- inadequate femoral offset (group 1: 40%, group 2: 51%)
- abductor deficiency (group 1: 20%, group 2: 33.3%)
- extra-articular impingement (group 1: 11.4%, group 2: 10.3%).

Recurrence rate of dislocation was significantly higher in the group 2 (20.5% versus 5.7%; OR 3.6, 95%CI 2.8-4).

Surgical strategies, isolated or combined, with respective efficacy for the prevention of dislocation recurrence were:

- modular head (bio-ball/option system) (group 1: 51.4%/88.9%, group 2: 64.1%/76%)
- cup revision (group 1: 68.6%/95.8%, group 2: 38.5%/80%)
- liner exchange (group 1: 22.9%/87.5%, group 2: 43.6%/88.2%)
- bone resection (group 1: 11.4%/100%, group 2: 10.3%/100%)
- stem revision (group 1: 5.7%/100%, group 2: 5.1%/100%)

During revision for dislocation, the acetabular construct was characterized by constrained liner (group 1: 26%, group 2: 39%), dual mobility cup (group 1: 17%, group 2: 15%), elevated rim liner (group 1: 31%, group 2: 41%), or neutral liner (group 1: 26%, group 2: 5%)

The acetabular constructs with **lower recurrence** of dislocation were constrained liner and dual mobility cup in the group 1 (0% respectively) and constrained liner and elevated rim liner in the group 2 (13.3% and 18.7% respectively).

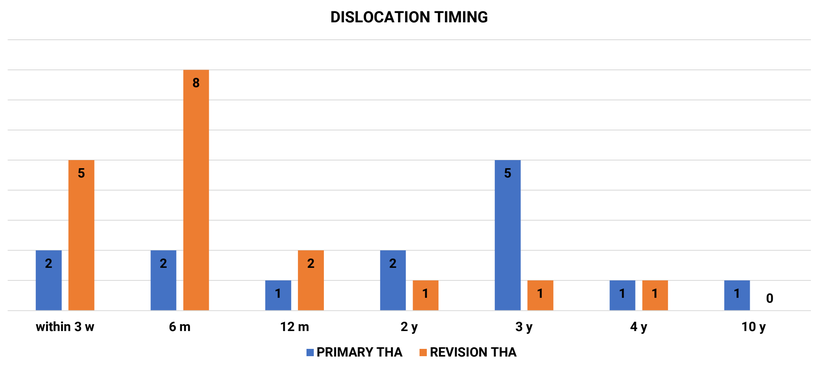
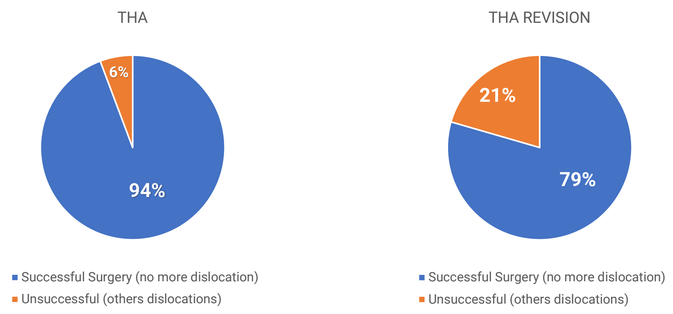
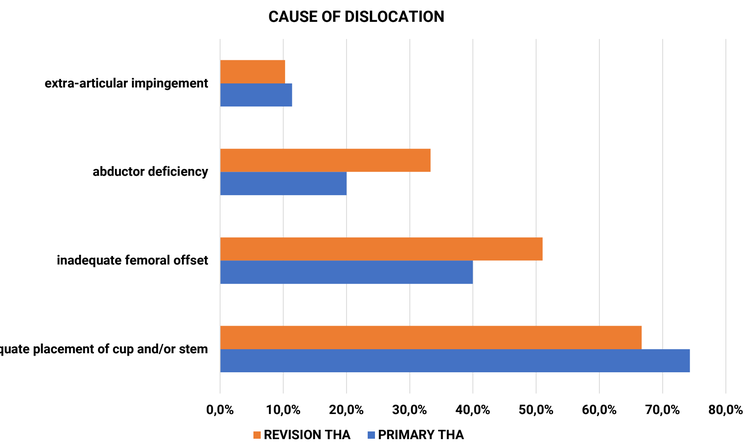
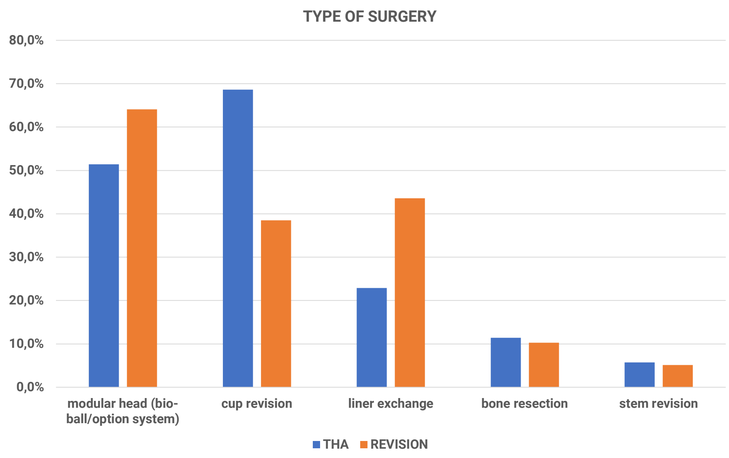


Table: success rate for both groups

	Total surgery		Successful Surgery (no more dislocation)		Unsuccessful (others dislocations)	
N° revisioni precedenti	n°	% su Tot	n°	% su Sottogruppo	n°	% su Sottogruppo
THA	35	47.3%	33	94.3%	2	5.7%
THA REVISION	39	52.7%	31	79.5%	8	20.5%







			ALL GROUPS				NO MORE DISLOCATION				NEW EPISODE OF DISLOCATION			
	OVERALL		GROUP 1		GROUP 2		GROUP 1		GROUP 2		GROUP 1		GROUP 2	
Surgical strategies isolated or combined	n°	%	n°	% on Tot	n°	% on Tot	n°	% on Tot surgery	n°	% on Tot surgery	n°	% on Tot surgery	n°	% on Tot surgery
modular head (bio-ball/option system)	43	58,1%	18	41,9%	25	58,1%	16	88,9%	19	76,0%	2	11,1%	6	24,0%
cup revision	39	52,7%	24	61,5%	15	38,5%	23	95,8%	12	80,0%	1	4,2%	3	20,0%
liner exchange	25	33,8%	8	32,0%	17	68,0%	7	87,5%	15	88,2%	1	12,5%	2	11,8%
bone resection	8	10,8%	4	50,0%	4	50,0%	4	100,0%	4	100,0%	0	0,0%	0	0,0%
stem revision	4	5,4%	2	50,0%	2	50,0%	2	100,0%	2	100,0%	0	0,0%	0	0,0%

Conclusions

The inadequate placement of cup and/or stem and inadequate femoral offset were the most frequent causes of dislocation. The recurrence rate of dislocation after surgery was three times higher in patients underwent previous revision THA. The use of modular head, isolated or combined, was effective in improving combined cup/stem orientation and femoral offset reducing the risk of dislocation recurrence. The constrained liner and dual mobility cup prevented recurrence of dislocation in patients with instability after primary THA.