

# OUTCOMES OF OSTEONECROSIS OF THE FEMORAL HEAD IN CHILDREN AND ADOLESCENTS

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## BACKGROUND

Osteonecrosis of the femoral head (ONFH) commonly affects pts in their 3rd-5th decade of life. However, we are seeing more and more patients under 21 years of age.

ONFH follows a progressive course leading to collapse of femoral head (FH) and hip joint destruction.

20K-30K new patients are diagnosed annually, and ONFH accounts for 5-12% of all Total Hip Arthroplasty done annually.

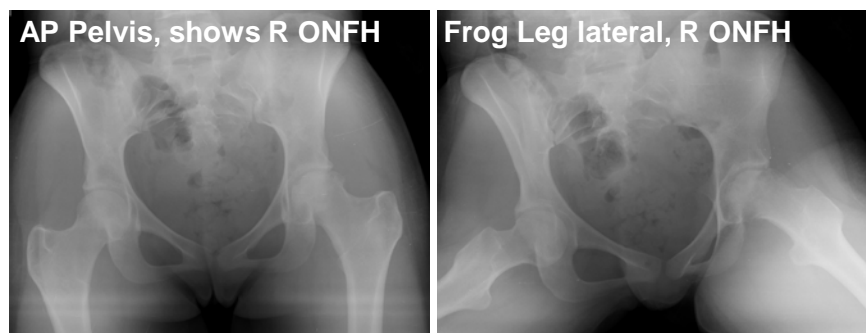
## PURPOSE

Evaluation of clinical and radiographic outcomes of children and adolescents  $\leq 21$  years of age with ONFH, who were treated with

- 1) Observation
- 2) Core Decompression (CD) alone or CD+BMAC injection,
- 3) proximal femur osteotomy (OST)

## CASE

20yo F with SLE and worsening R hip pain

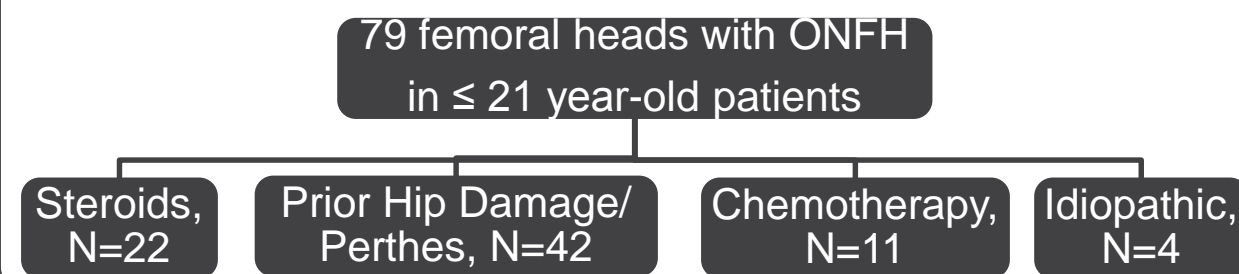


## STUDY DESIGN

Retrospective review: 2006-2018

**Inclusion:** ONFH due to chronic steroid use, Perthes disease/prior hip damage, chemotherapy treatment or idiopathic cause,  $\leq 21$  years of age

**Study Population:**



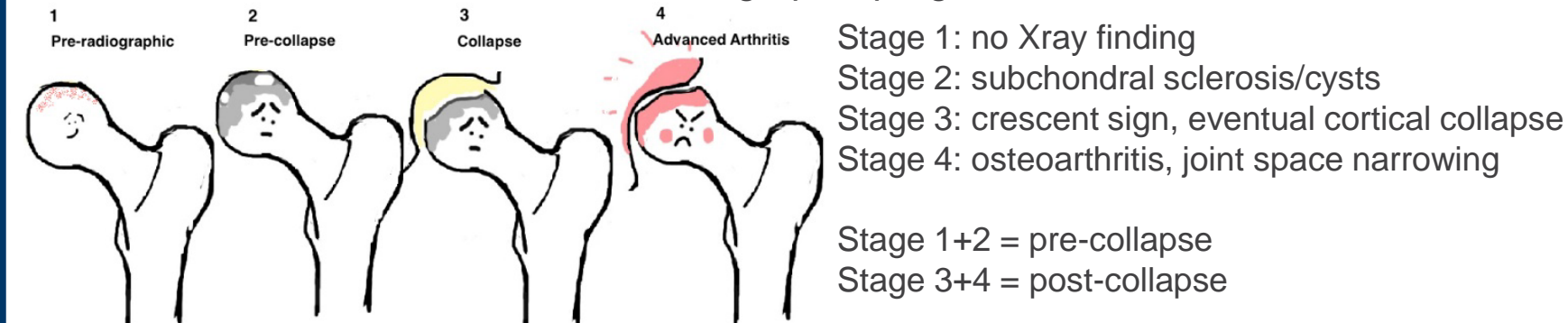
## DEMOGRAPHICS

Demographics	Observation N=56	CD +/- BMAC N=11	Osteotomy N=12	P-value
Gender, F	32 (57%)	5 (46%)	4 (33%)	0.277
Age at Diagnosis (years)	13.8 ±5.7	17.6 ±4.3	6.7 ±1.6	<0.005
Age at Surgery (years)	-	18.0 ±4.4	7.7 ±1.9	0.299
BMI at Surgery/Diagnosis	23.8 ±7.8	24.4 ±4.8	22.4 ±10.5	0.066
Etiology, % within etiology				0.005
Steroid	14 (64%)	8 (36%)	0	
Perthes/Prior Hip damage	31 (74%)	0	11 (26%)	
Idiopathic	2 (50%)	1 (25%)	1 (25%)	
Chemotherapy treatment	9 (82%)	2 (18%)	0	
Follow-Up (years)	6.1 ±3.5	2.7 ±2.2	4.0 ±1.9	<0.005
Hip Symptomatic, yes	28 (62%)	11 (100%)	12 (100%)	<0.005
Fem head collapse pre-op	31 (55%)	4 (36%)	9 (75%)	0.205
Osteonecrosis at other site	9 (16%)	3 (27%)	0	0.149

Data presented as Mean ± SD or N (%). Statistics: t-tests or Wilcoxon rank-sum tests for continuous variables, chi-square or Fisher's exact tests for categorical variables.

## PROGRESSION OF OSTEONECROSIS

Osteonecrosis was assessed at presentation/pre-operatively and at most recent F/U using the Ficat classification to determine radiographic progression of ONFH:



Progression of Ficat Stage	Observation	CD +/- BMAC	Osteotomy
Steroid	9/14 (64%)	5/8 (63%)	-
Perthes/Prior Hip Damage	17/30 (57%)	-	4/11 (36%)
Chemotherapy	5/9 (56%)	2/2	-
Idiopathic	1/2	1/1	1/1
<b>Total - Progression of Ficat stage</b>	<b>34/55 (62%)</b>	<b>8/11 (75%)</b>	<b>5/12 (42%)</b>

- Radiographic progression of osteonecrosis was highest in the CD+/-BMAC group, followed by the observation group and the osteotomy group ( $P=0.322$ ).
- Progression to femoral head collapse during the F/U period occurred in 6/11 steroid, 8/13 Perthes/prior hip damage, 2/7 chemotherapy, and 2/3 idiopathic cases.

## PROGRESSION TO THA

Progression to Total Hip Arthroplasty (THA) was statistically significant different between treatment groups ( $p=0.023$ ) and between etiologies ( $p<0.005$ ).

Progression to THA by Etiology	Observation	CD +/- BMAC	Osteotomy	P-value
Steroid	6/14 (43%)	4/8 (50%)		1.000
Perthes/Prior Hip Damage	3/31 (10%)		0/11	0.554
Chemotherapy	2/9 (22%)	1/2	-	0.491
Idiopathic	0/2	0/1	0/1	N/A
<b>TOTAL</b>	<b>11/56 (20%)</b>	<b>5/11 (45%)</b>	<b>0/12 (0%)</b>	<b>0.023</b>

- Progression to THA was highest in hips with ONFH due to chronic steroid use or chemotherapy who were treated with CD+/-BMAC followed by Observation.
- Overall, 10/22 (46%) steroid cases, 3/11 (27%) chemotherapy and 3/42 (7%) hips with Perthes/prior hip damage progressed to THA, but none of the idiopathic ONFH cases.

Progression to THA based on pre-operative Ficat stage

Pre-op Ficat stage	I	II	III	IV
Progression to THA - Observation	0/2 (0%)	4/23 (17%)	4/19 (21%)	3/12 (25%)
Progression to THA - CD+/-BMAC	-	2/7 (29%)	2/2 (100%)	1/2 (50%)
Progression to THA - Osteotomy	-	0/3	-	0/9
<b>TOTAL</b>	<b>0/2 (0%)</b>	<b>6/33 (18%)</b>	<b>6/21 (29%)</b>	<b>4/23 (17%)</b>

## FUNCTIONAL OUTCOMES

Outcome	Observation	CD +/- BMAC	Osteotomy	P-value
Hip Pain at F/U	15 (31%)	3 (33%)	4 (33%)	1.000
Ambulatory status at F/U				0.677
Independent	25 (51%)	7 (78%)	5 (45.5%)	
Independent with Limp	17 (35%)	2 (22%)	6 (54.5%)	
Crutches/Walker	3 (6%)	0	0	
Wheelchair	4 (8%)	0	0	

Data presented as N (%). Statistics: Fisher's exact tests.

- At most recent FU the amount of patients reporting pain was similar between groups.
- All patients in the CD+/-BMAC group and the osteotomy group ambulated independently, whereas 14% in the observation group needed assistive devices.

## CONCLUSION

❖ CD or CD+BMAC did not achieve clinical improvement compared to non-operative treatment.