OUTCOMES OF OSTEONECROSIS OF THE FEMORAL HEAD IN SICKLE CELL DISEASE (SCD):

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BACKGROUND

Osteonecrosis of the femoral head (ONFH) affects as many as 10% of individuals with Sickle Cell Disease (SCD).

ONFH is a well-described complication of temporary or permanent vaso-occlusion to the hip joint due to SCD.

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

AIM

To determine the impact of CD or CD+BMAC injection compared with non-operative treatment on ONFH in people with SCD in terms of efficacy and safety.

STUDY DESIGN & DEMOGRAPHICS

Retrospective review: 2006-2018
Inclusion: ONFH due to SCD
Exclusion: Prior hip surgery, hip osteotomy

Study Population:

285 femoral heads with ONFH due to SCD

- Initial non-operative Treatment, N=240
- Core Decompression (CD), N=18
- CD + BMAC, N=27

Demographics	Non-Operative	CD	CD+ BMAC	*P-value*
Gender, F	101 (42%)	10 (56%)	12 (44%)	*0.533*
Age, yrs	27.1 ±10.3	24.6 ±12.5	20.3 ±8.9	*<0.005*
BMI	23.4 ±5.6	27.2 ±1.9	20.8 ±6.0	*0.299*
B/L Hip affected	190 (81%)	15 (83%)	24 (89%)	*0.479*
Hip Symptom.	172 (73%)	18 (100%)	23 (92%)	*0.005*
FH collapse	72 (34%)	6 (33%)	10 (37%)	*0.939*
FU, yrs	7.1 ±3.8	7.2 ±3.1	1.8 ±1.0	*<0.005*

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.

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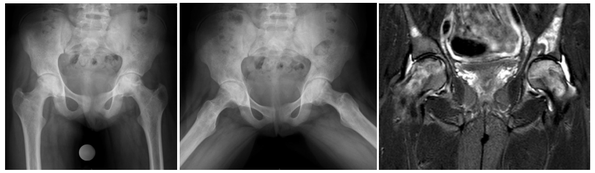
CASE & SURGICAL TREATMENT OPTIONS

Case: 23yo F with SCD, presents with b/l hip pain, L>R

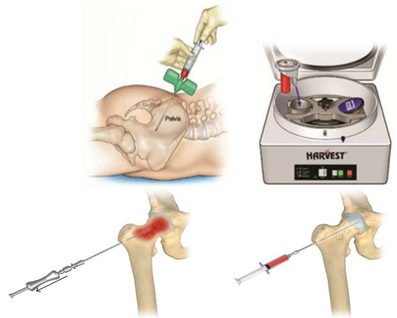


From the left:
AP Pelvis and Frog leg lateral Hip Radiographic images, as well as MRI of the pelvis showing ONFH

Surgical Treatment: Core Decompression (CD) ± BMAC

CD ± BMAC are widely used for treatment of early-stage ONFH and intended to reduce intraosseous pressure in the femoral head, restore vascular flow & improve pain.

Core Decompression



Bone Marrow Aspiration & Concentration

BMAC Injection

COMPARISON OF SURGICAL TREATMENTS

Surgical parameters were compared between patients who underwent CD or CD+BMAC.

Parameters	CD, N=18	CD + BMAC, N=27	*P-value*
Time Diagnosis to Surgery, yrs	1.6 ±2.0	0.72 ±0.6	*0.290*
Age @ Surgery, yrs	26.2 ± 12.4	21.3 ± 8.8	*0.297*
Femoral head collapse	6 (33%)	10 (37%)	*1.000*
Estimated blood loss, ml	37.9 ±41.6	24.4 ±41.1	*0.015*
Peri-op. Transfusion	1 (5.6%)	2 (7.4%)	*1.000*
Length of stay, days	3.1 ±2.4	2.7 ±1.6	*0.656*

Data are presented as Mean ± SD or N (%). Statistics: Kruskal Wallis test for continuous variables, chi-square or Fisher's exact tests for categorical variables.

- **Both, CD and CD+BMAC are safe surgical procedures.**

PROGRESSION OF OSTEONECROSIS

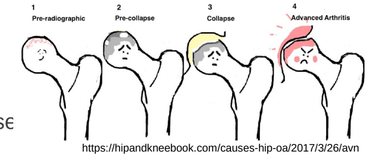
Progression to Total Hip Arthroplasty (THA)

Progression to THA was not statistically significant different between treatment groups.

	Non-Operative	CD	CD+BMAC	*P-value*
Progression to THA	37/238 (15%)	6/18 (33%)	4/27 (15%)	*0.138*

Radiographic Progression of Osteonecrosis

Ficat classification system
Stage I: no Xray finding
Stage II: subchondral sclerosis/cysts
Stage III: crescent sign, eventual cortical collapse
Stage IV: osteoarthritis, joint space narrowing



https://hipandkneebook.com/causes-hip-oa/2017/3/26/avn

	Non-Operative	CD	CD+BMAC	*P-value*
Progression of Ficat stage	27/111 (24%)	7/13 (54%)	8/21 (38%)	*0.055*

- Radiographic progression of osteonecrosis was highest in the CD group, followed by the CD+BMAC group and the Non-Operative group.
- Overall, more hips with pre-operative Ficat stage III and IV (40/83) progressed to THA than with pre-operative Ficat stage I or II (5/164).

FUNCTIONAL OUTCOMES

Outcome	Non-Operative	CD	CD+BMAC	*P-value*
Hip Pain at FU, yes	70 (31%)	7 (38.9%)	7 (26.9%)	*0.697*
Ambulatory status at FU				*0.922*
Independent	187 (82.7%)	14 (77.8%)	23 (85.2%)	
Independent with Limp	28 (12.4%)	3 (16.7%)	2 (7.4%)	
Crutches/Walker	9 (4%)	1 (5.6%)	2 (7.4%)	
Wheelchair	2 (0.9%)	0 (0%)	0 (0%)	

Data presented as N (%). Statistics: chi-square or Fisher's exact tests.

- At most recent FU, pain and ambulatory status were similar between groups.
- ~80% of patients in each group were ambulating independently without gait abnormalities.

CONCLUSIONS

- **CD or CD+BMAC did not achieve clinical improvement compared to non-operative treatment.**
- **Radiographic progression of osteonecrosis (Progression of Ficat stage) occurred similarly between treatment groups**