e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(12); 973-976

Original Research Article

Core Decompression with Autologous Bone Marrow Aspirate for Avascular Necrosis of Femoral Head at Pre Collapse Stage: A Clinical Study

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Received: 20-11-2023 Revised: 08-12-2023 / Accepted: 22-12-2023
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Conflict of interest: Nil

Abstract

Background: Avascular necrosis (AVN) is the bone death caused due to impaired blood supply and it leads to its collapse of femoral head, causing pain and compromised joint function. One of the treatment modalities of AVN, core decompression, reduces the Intra-osseous pressures and aids in halting the disease progression. Our study was conducted to study the outcome of Core decompression (CD) for the treatment in early stage osteonecrosis of the femoral (up to ficat arlet stage 2b)

Materials and Methods: This study was conducted in our tertiary care centre from May 2021 to may 2023. 50 Patients with Avascular necrosis of the femoral head (up to grade 2B of Ficat and Arlet classification) were included in this study. Patients were treated with core decompression and autologous bone marrow aspirate. The Harris Hip Score (HHS) was used to assess the outcomes.

Results: Out of 50 patients, majority (80%) of the patients in our study were in the 30 to 40 year age group, making it the most common age group with a male predominance (90 %). The mean HHS was 69preoperatively and 95 at six months postoperatively.

Conclusion: Core decompression is a good procedure in Ficat and arlet stages 1 and 2 AVN femoral head as it improves functional outcomes

Keywords: Avascular Necrosis, Core Decompression, Harris Hip Score.

Introduction

Osteonecrosis or the avascular necrosis (AVN) of the femur head (ONFH), has many etiological factors and generally affects young population and may if not managed within time, eventually leads to the collapse of femur head and may requiring hip replacement. Though it may be painless at early stages with due time the presentation is painful with limitation of hip motion [1]. Early treatment may be conservative and symptomatic management but with due time and increasing pain, other modalities like core decompression can be tried and in late stages, hip replacement may become the only option available. What Core decompression (CD) does is reduction in the pressure in the bone, opening up the hardening zone that hinders the repair of osteonecrosis and stimulating the formation of blood vessels around the decompression tunnel. It delays the progression of osteonecrosis by enhancing the replacement of the new bone [2,3,4].

In 2006, some studies showed that percutaneous decompression and autologous bone marrow mononuclear cell infusion reported clinical efficacy and safety of the treatment in AVN of femoral head [5]. For core decompression, the most ideal lesion is one with pre collapse and small lesion (<15 % of femoral head or Kerboul angle <200°) [6,7,8,9,]. Core decompression is performed by drilling and removing an 8- to 10-mmcylindrical core from the osteonecrotic lesion [10].The purpose of this study was to evaluate the efficacy of core decompression with bone marrow in the treatment of Osteonecrosis of femoral head

Material and Method

This prospective study was conducted in our tertiary care centre from may 2021 to may 2023 and included 50 patients of the age group of 30 to 60 years with Avascular necrosis of of the femoral head (up to grade 2B of Ficat and Arlet classification). Ethical approval was taken and all

the patients were explained the procedure and consent taken.

Procedure:

An entrance hole was made at the lateral aspect of proximal femur just below the vastus ridge of the greater trochanter by drilling with a 2 mm guide wire and 9 mm. drill bit and it entered into the necrotic lesion of the head. The autologous bone marrow of 15 cc was aspirated from iliac crest and by using a bone biopsy needle it was injected into the femoral head through the core hole. Postoperatively patients were advised six weeks of non-weight bearing with walker. The patients were followed at 3 months and 6 months. Harris hip score was used to evaluated functional outcome at 6 months

Figure 1: entrance with guide wire for core decompression (radiological image)

Figure 2: entrance with guide wire for core decompression (clinical image)

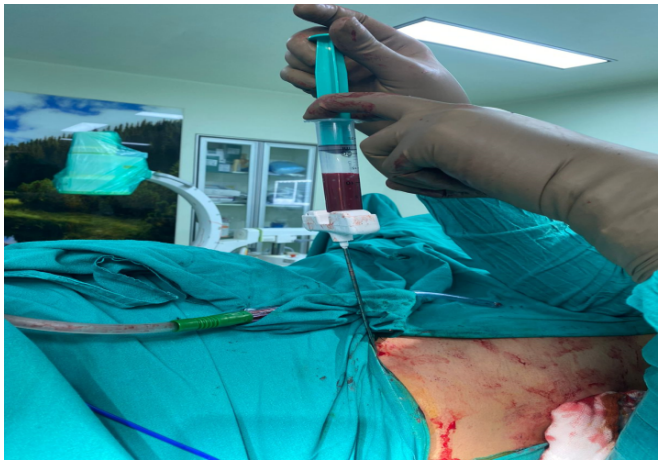

Figure 3: bone marrow aspiration from iliac crest with biopsy needle

Figure 4: Pre op x ray

Figure 5: Post op x ray after core decompression

Results

This prospective study included a total of 50 patients with avascular necrosis of the femoral head up to ficat arlet grade 2b and age group from 30 to 60. Majority of patients were within the age range of 30 to 40 years (80%). the study included 45 males (90 %). Preoperative and 6 months post operative Harris Hip Score was calculated for each patient and it encompassed various domains including pain, functional activity, range of motion, and gait, culminating in the calculation of the overall mean HHS.

The HHS scores for each domain before and after 6 months of surgery demonstrates significant improvements across all domains after core decompression especially the pain domain (table 1)

A notable change was observed in final HHS, which increased significantly from a preoperative mean of 69± 6 to a postoperative 6 months mean of 95±8 ($p<0.05$) and shows that patients experienced substantial improvements in all domains including functional status, pain reduction, gait pattern, and range of motion following core decompression .

Table 1: Harris hip score

Factors included in HHS	Pre operative	Post operative 6 months	P value
Pain	22±3	42±4	<0.05
Functional activity	9±1	13±2	<0.05
Range of motion	6±1	7±1	<0.05
Gait	32±1	33±1	<0.05
Final HHS	69±6	95±8	<0.05

Discussion

Drilling into necrotic areas in core decompression is one of the most widely used treatments for avascular necrosis femoral head as it increases blood flow supply and improves bone marrow edema [11]. In the early time, Hernigou and Gangji used autologous bone marrow cells respectively to repair defects after removal of necrotic lesions of femoral head. Both have achieved good results. [12,13]. In our study, the majority of participants belonged to the age group of 31 to 40 years (80%). studies by Hernigou et al, Mont et al , Vardhan et al have reported similar age distributions [14,15,16,17]. In 1985, Ficat reported "good to very good results" in 90% of hips on clinical evaluation and in 79% on radiographic evaluation on a study of 133 hips with Stages I and II disease treated by core decompression [18]**.** In our study, the final HHS demonstrated a increase from a mean preoperative score of 69±6 to a mean postoperative score of 95±8 . few similar studies including one by Agarwal et al reported improvements in mean HHS scores following similar interventions.[19]**.** Similar to our study, Sen et al. reported significant improvement in cases with poor preoperative functional score and presence of radiographic changes seen on MRI [20]

Conclusion

Core decompression when combined with use of autologous bone marrow aspirate is an effective and safe method of treating AVN femoral head up to pre collapse stage (1 and 2) and it improves overall functional activity of patient .

References

1. Mont MA, Jones LC, Hungerford DS. Non-traumatic osteonecrosis of the femoral head: Ten years later-current concepts review J Bone Joint Surg Am. 2006; 88:1107-29.
2. Mont MA, Ragland PS, Etienne G. Core decompression of the femoral head for osteonecrosis using percutaneous multiple small-diameter drilling. Clin Orthop Relat Res. 2004; 429:131–8.
3. Zhang HJ, Liu YW, Du Z-Q, et al. Therapeutic effect of minimally invasive decompression combined with impaction bone grafting on osteonecrosis of the femoral head. Eur J Orthop Surg Traumatol. 2013; 23(8):913–9.

4. Steinberg ME, Larcom PG, Strafford B, et al. Core decompression with bone grafting for osteonecrosis of the femoral head. Clin Orthop Relat Res. 2001; 386:71–8.
5. Yan ZQ, Chen YS, Li WJ, Yang Y, Huo JZ, Chen ZR, et al. Treatment of osteonecrosis of the femoral head by percutaneous decompression and autologous bone marrow mononuclear cell infusion. Chin J Traumatol. 2006; 9:3-7.
6. Yoon TR, Song EK, Rowe SM, Park CH. Failure after core decompression in osteonecrosis of the femoral head. Int Orthop. 2001; 24(6):316.
7. Iorio R, Healy WL, Abramowitz AJ, Pfeifer BA. Clinical outcome and survivorship analysis of core decompression for early osteonecrosis of the femoral head. J Arthroplasty. 1998;13(1):34.
8. Mazieres B, Marin F, Chiron P, Moulinier L, Amigues JM, Laroche M, et al. Influence of the volume of osteonecrosis on the outcome of core decompression of the femoral head. Ann Rheum Dis. 1997; 56 (12):747.
9. Mont MA, Jones LC, Pacheco I, Hungerford DS. Radiographic predictors of outcome of core decompression for hips with osteonecrosis stage III. Clin Orthop Relat Res. 1998; (354) :159.
10. Koo KHMM, Jones LC. Osteonecrosis. New York: Springer; 2014.
11. C. Lüring, C. Benignus, and J. Beckmann, Operative gelen kerhal tende Therapie der Hüftkopfne krose, Orthopade, 2018;47(9): 745–750.
12. P. Hernigou and F. Beaujean, Treatment of osteonecrosis with autologous bone marrow grafting, Clinical Orthopaedics and Related Research, 2002; 405: 14–23.
13. V. Gangji, J. P. Hauzeur, C. Matos, V. de Maertelaer, M. Toungouz, and M. Lambermont, Treatment of osteonecrosis of the femoral head with implantation of autologous bone-marrow cells. A pilot study, The Journal of Bone & Joint Surgery, 2004; 86(6): 1153–1160.
14. Hernigou PH, Beaujean F, Lambotte JC. Decrease of mesenchymal stem cell pool in the upper femoral extremity of patients with osteonecrosis related to corticosteroid therapy. J Bone Joint Surg Br. 1999;81: 349-55
15. Hernigou P, Poignard A, Manicom O. The use of percutaneous autologous bone marrow transplantation in nonunion and avascular necrosis of bone. J Bone Joint Surg Br. 2005; 87:896-902.
16. Mont MA, Jones LC, Einhorn TA, Hungerford DS, Reddi AH. Osteonecrosis of the femoral head. Potential treatment with growth and differentiation factors. Clin Orthop Relat Res. 1998; 355: S314-35.
17. Vardhan H, Tripathy SK, Sen RK, Aggarwal S, and Goyal T. Epidemiological Profile of Femoral Head Osteonecrosis in the North Indian Population, Indian J Orthop. 2018;52 (2):140-6.
18. Ficat RP: Idiopathic bone necrosis of the femoral head. J Bone Joint Surg. 1985; 67B:3–9.
19. Agarwal T, Patel PS, Sooknundun M, Mohapatra AR, Joshi HS, Salgia A. Management of stage I and II A/B avascular necrosis of femoral head with core decompression autologous cancellous bone grafting and platelet rich plasma factors. Med J DY Patil Univ. 2015; 8:713-8.
20. Sen R.K, Tripathy S.K, Aggarwal S, Marwaha N, Sharma R.R, Khandelwal N. Early results of core decompression and autologous bone marrow mononuclear cells instillation in femoral head osteonecrosis: a randomized control study. J Arthroplasty. 2012; 27 (May): 679-68