

Core Decompression as Treatment in Avascular Necrosis of the Femoral Head

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Article information Abstract

Key words	Core decompression is a minimally invasive surgical procedure commonly used to treat avascular necrosis (AVN) of the femoral head, a condition caused by disrupted blood supply leading to bone death and eventual joint collapse. The procedure involves drilling one or more small channels into the necrotic bone to relieve intraosseous pressure, enhance vascularization, and stimulate the formation of new bone tissue. Core decompression is most effective in the early stages of AVN (Ficat stages I and II), where joint collapse has not occurred. Clinical outcomes : suggest significant pain relief and improved function in patients with early-stage AVN. When combined with adjunct therapies, such as bone grafts, stem cells, or biologics, the success rate improves further. While it is generally considered safe, complications : such as fractures are possible. This review highlights the indications, technique, efficacy, and potential complications of core decompression for AVN of the femoral head.
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I) Introduction

Osteonecrosis of the femoral head is a disease affecting adults aged between 40 and 50, more often male, which leads to the necrosis and collapse of the femoral head. This pathology has multifactorial origins and progressive evolution

Risk factors for AVN/FH are estimated to be associated with alcohol use in 20%–40%, steroid treatment in 35%–40%, and idiopathic etiologies in 35%–40% of the cases.

Osteonecrosis of the femoral head is a pathologic process with multifactorial origins, characterised by pain, alteration of the anatomy and biomechanics of the hip and increasing patient disability. The treatment method depends on the stage of the disease, the size and location of the lesions, whether the involvement is uni- or bilateral, the age of the patient, how active the patient is, their general health conditions and life expectancy.

Early presentation can be asymptomatic; when the disease becomes symptomatic the most common manifestation is deep pain in the groin referred to the buttock or knee. Physical examination may be normal until the FH collapses. The diagnosis of AVN is based on plain anteroposterior and frog-leg radiographs and MRI

Severity of avascular necrosis is determined by the staging system based on the consensus of the Subcommittee of Nomenclature of the International Association on Bone Circulation and Bone Necrosis (Patel, 2018). Staging is as follows:

- A) Plain radiograph, magnetic resonance imaging, and scintigraphy: normal**
- B) IIA Sclerotic and cystic lesion (absence of subchondral cystic formation)**
- C) B Subchondral collapse (crescent sign) and/or subchondral aliasing**
- D) Irregular femoral contour**
- E) Collapse of the femoral head, acetabular involvement, and articular destruction (osteoarthritis)**

Surgical techniques previously used include core decompression, the trap-door procedure, derotational and valgus/varus osteotomy, vascularised bone grafts from the peroneum and iliac crest and total hip replacement. None of these has been identified as gold standard for the treatment of osteonecrosis yet.

The purpose of this study was to summarize the efficacy of core decompression in the treatment of ONFH, to analyze the factors affecting the core decompression treatment of ONFH,

II) Methods

Totally, 24 consecutive patients (14 men and 10 women), with an average age of 43 (25-61) years, were included in a prospective study from February 2015 to January 2020.

The most frequent risk factors in the patients in this study were a history of steroid intake

The study done in misurata medical centre and Aljazeera orthopedic hospital - misurata – Libya ,
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About 5 cases with alcoholic abuse history . In about one fifth of the cases, no risk factors could be identified.

The inclusion criteria were the age above 25 yrs old , any patient with Avn of head of femur due to any cause other than pediatric cause and any stage if the total hip replacement is not exclusively indicated.

The exclusion criteria were the age above 25 yrs old, AVN Due to orthopedic pediatric cause , if the total hip replacement is exclusively indicated . un healthy for surgical interventions regarding to anesthesia opinion the patients were evaluated clinically using the scoring system of Harris (1969), and staging of the disease was made according to Ficat(1985) by plain radiography (anteroposterior and frog-leg projections) and by static 99Tc-MDP scintimetry.

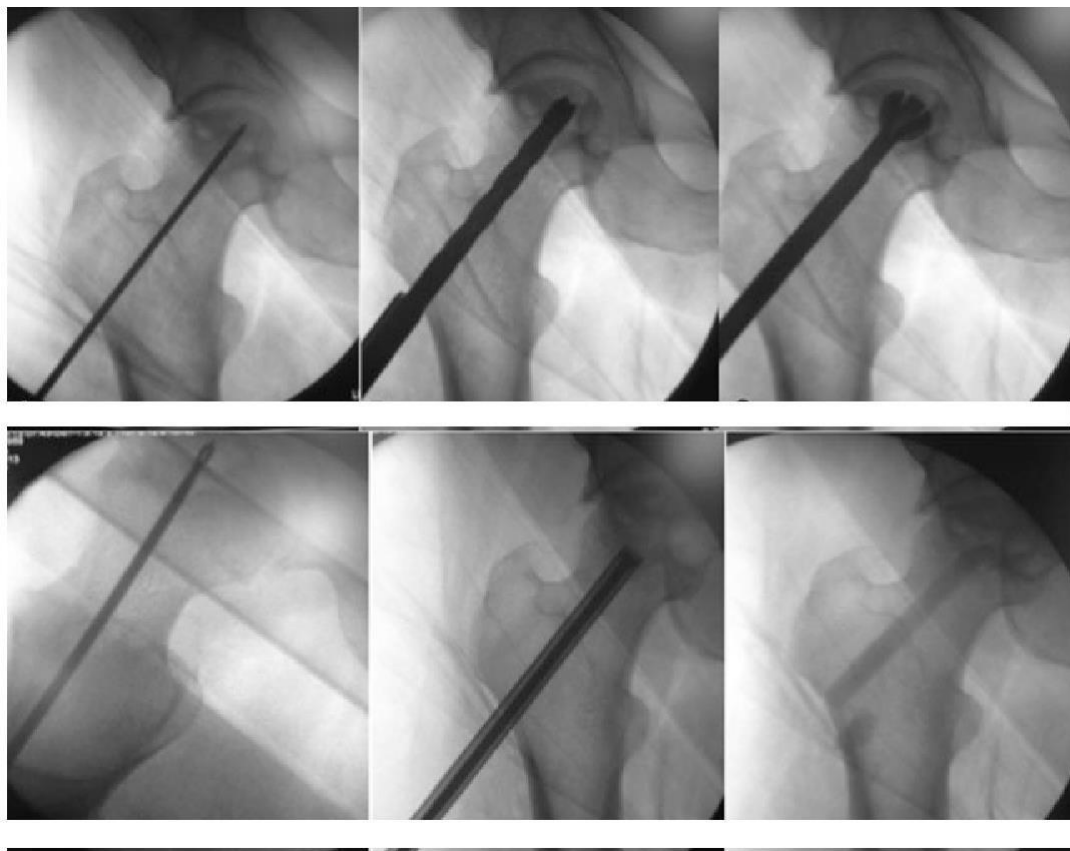
No patients without clinical, radiographic, or scintigraphic signs of osteonecrosis (i.e., Ficat's Stage 0) were included in this study, because we did not investigate any patients by measuring the intraosseous pressure or by core decompression for microscopy on clinical suspicion alone.

A) Technique of standard core decompression:

The patient is placed under general anesthesia and is then prepared and draped in an aseptic manner. Under fluoroscopic guidance, a Kirschner wire is drilled with an entry point laterally, but superior to the lesser trochanter medially.

Once it is determined that the guide wire is in the appropriate place, an 8- to 10- mm-wide trephine is inserted into the lesion with care not to penetrate the femoral head nor to violate the articular cartilage.

A core of bone is removed from the lesion, the skin is closed with one suture, and a sterile dressing is applied [5]. Following surgery, patients are discharged home the same day and are allowed 50 % weightbearing on the affected leg, for 6 weeks.



After 6 weeks, patients can progress to full weight-bearing. Patients are then given abductor strengthening exercises and educated to avoid high impact activities for 1 year.

Patients are followed up with plain radiographs and clinical evaluation at 6, 12 weeks, 6, 12 months, and annually thereafter.

Following decompression, the patients were allowed partial weight bearing only for 6 weeks.

III) Results:

The clinical and radiographic results of the core decompression were not correlated with the etiologic groups (Table 1). Half of the patients in Stages 1 and 2, i.e., before collapse of the femoral head, needed further surgery less than 1 year after the core decompression.

The causes of avascular necrosis's noted due to multiple causes as in the table below:

	Number of cases	percentage
Alcohol abuse	3	0.125
Malignant lymphoma	2	.0833
Idiopathic	4	.1666
Steroid intake	6	.25
fracture	9	.375

We use Harris' score for the assessment of the results of hip surgery and is intended to evaluate various hip disabilities preoperatively then postoperatively as in table below.

Case number	sex	Harris' score preoperatively	Harris' score postoperatively	Follow-up time in months
1	M	66	79	16months
2	M	65	74	16months
3	M	63	79	16months
4	M	57	78	16months
5	M	57	78	16months
6	M	49	80	16months
7	M	53	33	16months
8	M	66	85	16months
9	M	67	45	16months
10	M	68	88	16months
11	M	65	49	16months
12	M	63	80	16months
13	M	62	88	16months
14	M	68	84	16months
15	f	56	89	16months
16	f	49	80	16months
17	f	53	79	16months
18	f	55	-	--
19	f	76	77	16months
20	f	69	79	16months
21	f	67	87	16months
22	f	71	85	16months
23	f	49	82	16months

24	f	69	53	16months
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An increase in the preoperative Harris score and no progression in the radiographic stage were considered a successful outcome of the core decompression.

In Case 9 the pain became much more intense immediately after the decompression, although no fracture or other lesion was observed. Otherwise, no adverse effects of the decompression occurred, notably no fracture at the decompression hole.

Case 18 was lost to follow-up because he had moved abroad. The remaining patients were followed by clinical examination and radiographs at regular intervals until the final follow-up or until failure of the procedure had become obvious.

Failure of the procedure was defined as deterioration in the Hams score, and the time of failure was recorded as the date on which further surgery, usually total hip replacement, was decided on .four cases for THR. (24-11-9-7)

Correspondingly, in 4 patients with Stage2 osteonecrosis, the Harris score increased from 48 to 86, whereas the increase in 3 patients with Stage3 osteonecrosis was more limited. One patient in Stage 3 did not obtain any benefit from the decompression; but, because no further surgery had been decided on at the time of follow-up, he was not listed as a failure.

Harris score with ficat classification			
Stage	number	Preoperative	Post operative
1	13	54(44-68)	91 (76-100)
2	8	48(34-64)	55(78-96)
3	3	52(4&74)	75(72-78)

Pre and postoperative distributions of the Harris Hip classification scores

Etiology	Idiopathic	Steroid
Harris	Mean	Mean
Preop	58.71	55.24
Postop	89.86	83.11
Difference	31.14	28.04

IV)Discussion:

Osteonecrosis is a condition of multifactorial and extensive etiology, which hinders the definition of a single and standardized treatment. The number of factors that impact this condition and its progressive characteristic have fostered the use of several techniques aiming at improving early symptoms and the progression of the bone pathology. These multifactorial aspects make it difficult to conduct an unbiased study with statistically significant results. This condition continues to be underdiagnosed in its initial phase; if an early diagnosis is made, decompression is a possible treatment option. If the diagnosis is made in advanced stages, with established femoral head collapse, the indicated treatment is THA.

The treatment is planned according to the stage of the disease, its etiology, duration of symptoms, pain, and systemic disease. Patients with AVNFDH develop subchondral fracture within 2–3 years if not treated, and joint-conserving surgery cannot be performed.[5] In AVNFDH, core decompression

is thought to decrease blood pressure in the femoral head by decreasing the pressure in the early stage and conversion to implantation of total hip prosthesis and pain.

Ficat[9] presented core decompression for the first time in 1962. This procedure is intended to increase the blood supply to the necrotic area by means of a drill hole made from the distal end of the trochanter. In addition to core decompression therapy, there are also graft (vein–veinless fibula), mesenchymal stem cell, and tantalum rod applications. [15]

Core decompression is still the preferred procedure because it is simpler than other methods, and the complication is low. The most common complication of this method is proximal femur fracture, which is reported to range between 0% and 18% [17] (Fig. 1). In our series, 1 (3%) patient had subtrochanteric fracture. We think that the complication rate is due to the development of the technique and the progression of postoperative rehabilitation. [18] AVNHFH shows higher rates of bilateral joint involvement in 30%–70% of the cases. [5] In our series, bilateral joint involvement was observed in 40% of these cases. For this reason, both hips of the patients should be examined.

Mont et al. [19] compiled the outcomes of 1206 cases with AVNHFH reported in the literature up to now and revealed that forage exerts a significant positive effect on the course of the disease and increases survival rates in stages 1 and 2 from 35% to 85% and from 31.4% to 65%, respectively, compared with conservative treatment. As shown in our study, forage cannot prevent radiological progression, and progression rates reached 38.8%, 70.2%, and 88.8% in stages 1, 2, and 3, respectively.

Fairbank et al. [8] reported these rates as 62% and 93%, respectively. Disease progression was also seen in our stage 1 patients. AVNHFH induced by steroid use seen in 80% of the patients was associated with different follow-up periods of the patients

The normal course of the disease, which leads to femoral head collapse, was observed in 73.3% of the cases; 50% of the cases presented THA indication due to pain complaints, with a mean time until THA indication of 1.13 years after femoral head core decompression. Similarly to studies conducted in other centers, even with decompression, the observed out-come was the natural progression of the disease in most cases.

Considering that the aim of the treatment of AVNHFH is to obtain a painless and functional hip, this treatment method can be said to be clinically successful at an early stage.

V) Conclusion:

Core decompression of the femoral head aids in the painful symptomatology in the short-term but does not appear to alter the progression of the bone lesion. More studies are needed to determine the best type of treatment in the early stages of the disease, always with the ultimate goal of avoiding arthroplasty in young patients.

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