IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 15, Issue 5 Ver. IV (May. 2016), PP 36-39
www.iosrjournals.org

Core Decompression in Avascular Necrosis of Femoral Head – Single Drill Vs Multiple Drills – A Prospective Study

Dr Sankara Rao Pinnamaneni, Dr. Veera Reddy Gunda
Associate Professor , MIMS, Vizianagaram.
Assistant Professor, Osmania Medical College, Hyderabad, India.

Abstract: *Avascular Necrosis (AVN) Of Femoral Head Is A Common A Orthopedic Condition Across The World. Core Decompression Can Be Done With Single Large Drill And Multiple Smaller Diameter Drill Holes. In The Present Study We Analyse The Results Of Core Decompression Done By Both The Methods In Stage I & II Of Avascular Necrosis Of Femoral Head. . In Group A, 48 Patients Underwent Single Core Drill With 8mm Reamer, The Guide Pin Is Inserted Aiming The Sclerosed Affected Area. After Fixing The Pin In The Neck, It Is Reamed With Reamer Of 8mm Diameter . In Group B, 52 Patients Underwent Multiple Drills With 4mm Cannulated Drill Bits, The Guide Pins Are Aimed At The Sclerosed Affected Area And Then Drilled With 4 Mm Drill Bit. All 19 Hips That Had Ficat Stage I Had Significant Reduction Of Pain And Improvement Of Harris Hip Score. No Patient Has Required Further Surgery. Among The 29 Hips With Ficat II At Time Of Procedure, 80 % Of Hips Which Underwent Core Decompression With Single Drill (Group A) And 78 % Of Multiple Drill (Group B) Cases Had Significant Reduction Of Pain And Improvement Of HHS. Those Patients Showed No Radiographic Progression Of The Disease. The Remaining, 20 % Of Group A And 22 % Group B Eventually Progressed Radiologically To Grade III Or Grade IV And Had HHS Less Than 75 At Last Visit. In The 36 Cases With Ficat II, 52 % Group A And 52.8 % Group B Had Significant Reduction Of Pain And Improvement Of HHS. While Multiple Drilling Is Safer And Less Invasive Than Single Coring, There Is No Statistically Significant Difference In Outcome Or Complication Rate Between Both Procedures Done For Avascular Necrosis Of Femoral Head In Our Study Population.*

I. Manuscript

Avascular Necrosis (AVN) Of Femoral Head Is A Common A Orthopedic Condition Across The World.[1] In AVN, Blood Supply To The Head Of Femur Is Interrupted And Consequently Leading To Aseptic Necrosis. The Dead Bone Loses Its Strength And Deforms Under The Weight Of The Body, And Flattens. As The Deformity In Femoral Head Progress, It Leads To Wear In The Acetabulum Leading To Secondary Arthritis Of Hip. Major Underlying Causes Of The Disease Are Using Steroids, Scuba Diving Disease, Some Drugs And Trauma To The Joint.[2,3] Patient's Chief Complaint Is Pain In Hip, Which Is Felt Mostly In Front Of The Joint And In The Groin. Slowly The Joint Has Limited Motion, And After A While The Patient's Hip Becomes Stiff. As Femoral Head Deforms, Its Height Reduces And The Lower Limb Shortens. In Chronic Cases, Hip And Thigh Muscles Weaken And Atrophy.[4] Treating This Disease Depends On Its Severity (Stage Of The Disease) And The Extent Of The Involvement. The More Advanced The Disease, The More Extensive The Intervention. In Advanced Cases (Stage III & IV),Where Both Femoral Head And Acetabulum Are Destroyed, We Have No Choice But Total Joint Replacement Or Freezing The Joint.[5]

There Is Enough Evidence And Consensus On The Treatment In Stage III & IV. The Controversy Exists In The Preferred Treatment For Stage I And II. If The Progress Of The Disease Is Stopped, Femoral Head And Hip Joint Can Be Saved. To Do So Core Decompression Is The Only Choice. If The Disease Is Discovered At An Early Stage, And Femoral Head Is Not Deformed, Some Surgical Procedures Can Resupply Blood To It And Prevent The Progress Of The Disease. The Most Common Surgery Is Decompression Of Femoral Head. Core Decompression Reduces The Pressure Inside The Bone, And Thus Enhances Vascularity As Reduction Of Internal Pressure Opens Up The Capillaries And Supplies More Blood.

Core Decompression Can Be Done With Single Large Drill And Multiple Smaller Diameter Drill Holes. In The Present Study We Analyse The Results Of Core Decompression Done By Both The Methods In Stage I & II Of Avascular Necrosis Of Femoral Head.

II. Materials & Methodology

All Patients Who Were Diagnosed With AVN Of Femoral Head Stage I, II Who Were Willing To Participate, Entered The Study. Exclusion Criteria Were Systemic Diseases, Sickle Cell Anemia, And Local Bone Diseases Like Osteogenesis Imperfecta, Impossibility Of Having Core Decompression For Any Reason, Not Returning For Follow-Up Sessions, Inaccessibility Of Patients, And Force Major Events That Disrupt Cooperation Such As Death. Then, Patients Were Interviewed And Examined, And A X-Ray Was Taken.

Furthermore, The Severity Of Pain And Range Of Motion Of Hip Joint Was Recorded Using VAS Criteria.Patients Receive General Or Spinal Anesthesia And Then, Standard Lateral And Proximal Hip Incision Is Made In The Afflicted Side. After Incising Subdermal Tissue, Lateral Fascia, And Relevant Muscles, The Insertion Point Of Guide Pin Under The Greater Trochanter Is Exposed. In Group A, 48 Patients Underwent Single Core Drill With 8mm Reamer, The Guide Pin Is Inserted Aiming The Sclerosed Affected Area. After Fixing The Pin In The Neck, It Is Reamed With Reamer Of 8mm Diameter [Fig 1]. In Group B, 52 Patients Underwent Multiple Drills With 4mm Cannulated Drill Bits, The Guide Pins Are Aimed At The Sclerosed Affected Area And Then Drilled With 4 Mm Drill Bit [Figure 2].

After The Surgery, Patient's Information Was Recorded In A Specific Checklist. Six And 12 Months After Surgery, Final Assessment Of Motion Range, Return To Work, And Severity Of Pain In Thigh Was Performed. The Duration Of Hospitalization And Rate Of Infection Were Also Recorded. Standard Lat And A/P X-Ray Were Taken At 6 And 12 Months To Evaluate Patient's Radiological Improvement. Harris Hip Score Was Assessed At Follow Up.

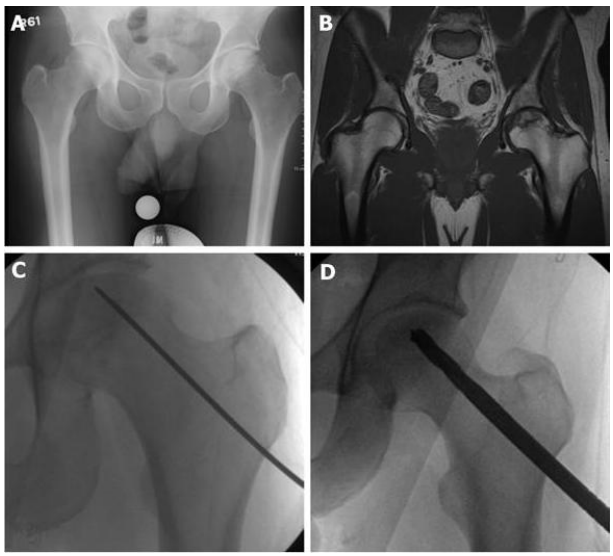

Fig 1 : Core Decompression Of Femoral Head Done With 8mm Single Drill Reamer.

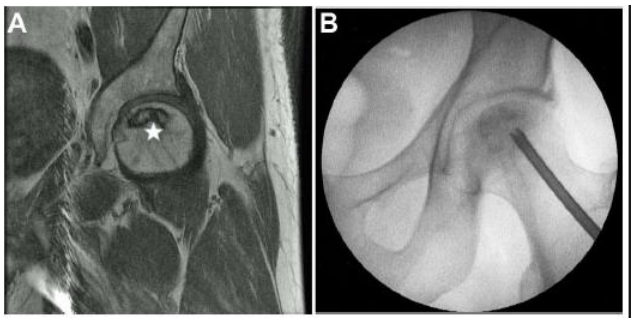

Figure 2: Core Decompression Of Femoral Head Done With 4 Mm Drill.

III. Results

All 19 Hips That Had Ficat Stage I Had Significant Reduction Of Pain And Improvement Of Harris Hip Score. No Patient Has Required Further Surgery. Among The 29 Hips With Ficat II At Time Of Procedure, 80 % Of Hips Which Underwent Core Decompression With Single Drill (Group A) And 78 % Of Multiple Drill (Group B) Cases Had Significant Reduction Of Pain And Improvement Of HHS. Those Patients Showed No Radiographic Progression Of The Disease. The Remaining, 20 % Of Group A And 22 % Group B Eventually Progressed Radiologically To Grade III Or Grade IV And Had HHS Less Than 75 At Last Visit. In The 36 Cases With Ficat II, 52 % Group A And 52.8 % Group B Had Significant Reduction Of Pain And Improvement Of HHS. The Rest Showed No Improvement In Pain And Function, And Progressed To Stage IV; 11 Of Them Underwent THA And One Patient Refused Any Further Surgery.

Mean Duration Of Hospitalization Was 3.5 ± 1.06 Days In Both The Groups. Minimum And Maximum Duration Of Hospitalization Were 2 And 6 Days, Respectively. Mean Time Of Return To Work In All Patients Was 2.59 ± 1.1 Months, With A Minimum Of 1 And A Maximum Of 6 Months. After Surgery, Only One

Patient (4.5%) Had Superficial Infection At The Operation Site In Group A, Which Improved With Oral Antibiotic. There Were No Similar Cases In Group B.

Limitation Of Our Study Is 1 Year Follow Up. Longer Follow Up Is Required To Assess Rate Of Progression Of Disease In Relation To Stage Of Disease At Operation.

IV. Discussion

The Surgical Interventions In Avascular Necrosis Of Femur Head Have To Be Planned With The Intention Of Preserving The Joint And Keeping In Mind Future Surgeries Required. Wang *Et Al*, [6] Have Shown Short-Term Effect Of Increased Femoral-Head Blood Flow Due To Core Decompression In The Rabbit Model. The Results Of Study Showed That The Decrease In Femoral Head Blood Flow Due To Prolonged Steroid Therapy Was Reversed By Core Decompression. Femoral Head Perfusion Can Return To A Normal Or Slightly Elevated State, Four Weeks After Treatment. Core Decompression Is Expected To Relieve The Pain And To Allow Creeping Substitution To The Necrotic Area By Bringing The Blood Supply Through The Drill Channels.

A Meta-Analysis [7] Of 24 Reports Analyzing 1,206 Hips Treated By Core Decompression With Or Without Cancellous Bone Grafting In Stage I And II Revealed An Overall Clinical Success Rate Of 63.5% (Range 33 To 95%). Less Than 33% Of The Hips Required A Replacement Or Salvage Procedure During The Follow-Up Period.

The Conventional Method Of Doing Core Decompression Involves The Use Of An 8 Mm Trephine Or Cannula Inserted Under Fluoroscopic Guidance To Penetrate The Lesion. Complications Can Occur With Multiple Drillings With The Use Of These Large-Diameter Trephines Which Can Weaken The Femoral Head Or When The Trephine Penetrates The Femoral Head, Can Injure The Articular Cartilage, And Enter The Joint Space. [8] In Addition, If The Core Tract Is Started In The Subtrochanteric Or Diaphyseal Area, Rather Than Entering Through The Metaphyseal Region Of The Proximal Femur, The Stress Risers Created Can Lead To A Subtrochanteric Fracture. [9] A Change In This Technique Of Core Decompression Has Been Suggested Lately With The Claim Of Being Safer. [10,11] The Procedure Of Core Decompression By Multiple Small Drillings Was Presented In The Annual ARCO Meeting By Kim *Et Al*, [9] In 2004. They Compared The Results Of The Efficacy Of Two Decompressive Methods (Multiple Drilling Vs Conventional Core Decompression) For The Treatment Of Pre-Collapse Osteonecrosis Of The Femoral Head In A Consecutive Series Of 54 Patients. They Reported That Radiographically And Clinically, High Failure Was Significantly Related To The Larger Size And Laterally Located Lesion In Both Groups. The Average Pre-Operative And The Last HHS Was 86.7 To 73.7 In Single Core Decompression And 87.0 To 74.6 In Multiple Drilling. The Group Who Had Undergone Multiple Drilling Had Significantly Longer Time Before Collapse (Mean 42.3 Months Vs 22.6 Months, P =0.011) And Lower Rate Of Collapse Within 3 Years After Operation (55.0% Vs 85.7%, P =0.03) Than Single Large Core Decompression.

Mont *Et Al*,[12] In 2004 Reported Similar Results With The Use Of Small Multiple Drillings (3-Mm Drill Bits) To Do Core Decompression. Postoperatively, Their Patients Were Maintained At Approximately 50% Weight Bearing For 5–6 Weeks Using A Cane Or Crutch In The Opposite Hand From The Hip That Was Operated. If The Patient Had Bilateral Core Decompression, Two Crutches Were Used For A 4-Point Gait. After 5–6 Weeks, The Patients Were Advanced To Full Weight Bearing As Tolerated. High-Impact Loading Such As Jogging And Jumping Was Not Permitted For 12 Months. Rehabilitation Throughout Recovery To Include Hip Abductor Strengthening And ROM Exercises Was Encouraged. If Patients Were Asymptomatic At 10–12 Months Postoperatively With No Radiographic Evidence Of Collapse, They Were Allowed To Resume All Usual Activities, Including Higher Impact Loading Activities (Such As Running). It Was Also Observed That This Procedure Compared Favorably To Historical Complication Rates For Core Decompression That Often Occurred 10–15% Of The Time And Included Femoral Fracture Or Head Blowout.[13] In This Series, There Were No Serious Complications That Would Be Expected As An Advantage Of Using 3.2-Mm Steinman Pins Percutaneously To Do The Procedure. They Opined That This Was An Appropriate Method Of Core Decompression When Treating Symptomatic Patients With Small-Sized Or Medium-Sized Precollapse Lesions.

In Our Study Population, We Did Not Notice Any Difference In Results Among Both The Groups. The Overall Result And Progress In AVN Was Similar To Literature Rates. However, We Feel Longer Follow Up Period Would Be Needed To Have More Analysis.

V. Conclusion

While Multiple Drilling Is Safer And Less Invasive Than Single Coring, There Is No Statistically Significant Difference In Outcome Or Complication Rate Between Both Procedures Done For Avascular Necrosis Of Femoral Head In Our Study Population.

References

[1]. Garino JP, Steinberg MA. Total Hip Arthroplasty In Patients With Avascular Necrosis Of Femoral Head. A 2 To 10 Years Follow Up. Clin Orthop Relat Res. 1997;334:108–15.

[2]. Koo SH, Song HR, Yang JW, Yang P, Kim JR, Kim YM. Trochanteric Rotational Osteotomy For Osteonecrosis Of Femoral Head. J Bone Joint Surg. 2001;83B:83–9.

[3]. Learmonth ID, Maloon S, Dall G. Core Decompression For Early Atraumatic Osteonecrosis Of Femoral Head.J Bone Joint Surg. 1990;72B:78–90.

[4]. Steinberg ME, Larcon PG, Strafford B, Hosick WB, Corces A, Bands RE, Et Al. Core Decompression With Bone Grafting For Osteonecrosis Of Femoral Head. Clin Orthop Relat Res. 2001;386:71–8.

[5]. Gangji V, Hauseur JP, Matos C, De Maertelaer V, Toungouz M, Lambermont M. Treatment Of Osteonecrosis Of Femoral Head With Implantation Of Autologous Bone-Marrow Cells. J Bone Joint Surg.2004;86-A:1153–60.

[6]. Wang GJ, Dughman SS, Reger SI, Stamp WG. The Effect Of Core Decompression On Femoral Head Blood Flow In Steroid-Induced Avascular Necrosis Of The Femoral Head. J Bone Joint Surg Am. 1985;67:121–4.

[7]. Mont MA, Carbone JJ, Fairbank AC. Core Decompression Vs. Non-Operative Management For Avascular Necrosis Of The Femoral Head. Clin Orthop Relat Res. 1996;324:169–78.

[8]. Hougaard K, Kuur E. Femoral Head Avascular Necrosis: MR Imaging With Clinical-Pathologic And 99mtc-SN-Pyrophosphate Scanning. Injury. 1988;19:389–92.

[9]. Kim SY, Kim DH, Park IH. Multiple Drilling Compared With Core Decompression For The Treatment Of Osteonecrosis Of The Femoral Head. J Bone Joint Surg Br. 2004;86:149.

[10]. 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.

[11]. Lausten GS, Mathiesen B. Core Decompression For Femoral Head Necrosis: Prospective Study Of 28 Patients. Acta Orthop Scand. 1990;51:507–11

[12]. Mont MA, Etienne G, Ragland PS. Outcome Of Nonvascularized Bone Grafting For Osteonecrosis Of The Femoral Head. Clin Orthop Relat Res. 2003;417:84–92

[13]. Multiple Drilling Compared With Standard Core Decompression For Avascular Necrosis Of The Femoral Head In Sickle Cell Disease Patients. Arch Orthop Trauma Surg. 2013 May;133(5):609-13