

The Modified Dunn Procedure for Unstable Slipped Capital Femoral Epiphysis: A Systematic review and Meta-analysis

*A Systematic review and Meta-analysis Submitted for partial
fulfillment of Master Degree in Orthopedic Surgery*

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وَقُلْ اَعْمَلُوا فَسَيَرَى اللّٰهُ
عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ



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Abstract

The management of slipped capital femoral epiphysis is controversial and evolving as insight into the condition develops. Loder introduced the concept of slip stability and demonstrated a strong association between poor outcome and instability. Almost half of patients with unstable slip developed femoral head osteonecrosis. This has been influential in surgeons' choice of treatments. Some surgeons have adopted a minimal intervention approach such as pinning in situ or gentle reduction and pinning whereas others advocated an urgent open reduction and stabilization of slip using various surgical techniques. The modified Dunn procedure has rapidly gained popularity as a treatment for unstable slipped capital femoral epiphysis. In this review we analyzed the results and complications following this procedure.

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List of Abbreviations

AP	Anteroposterior.
AVN	Avascular necrosis.
BMI	Body Mass Index.
FAI	Femoro – acetabular impingement.
HHS	Harris hip score.
PRISMA	Preferred Reporting Items for Systematic Review and Meta-analysis.
PTH	Parathyroid hormone.
SCFE	Slipped capital femoral epiphysis.
SPSS	Statistical package for social science.
1,25-(OH) ² D	1,25 dihydroxy vitamin D.

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Introduction

Introduction

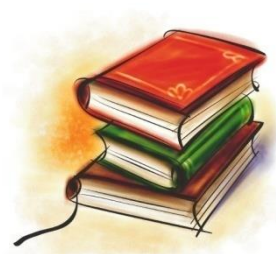
The treatment of slipped capital femoral epiphysis (SCFE) has been controversial for decades. It is in the nature of things that an anatomical reduction of the epiphysis provides the best condition for a good function of the hip joint in the long-term - given a surgical technique that can control the blood supply to the femoral head. The attempts to anatomically reduce the femoral epiphysis by a subcapital reorientation with an anterior approach in the mid of the last century have resulted in rates of avascular necrosis (AVN) up to 54%. In 1964, Dunn presented a promising technique of subcapital reorientation through a posterior approach with a trochanteric osteotomy with a risk of avascular necrosis of only 4%. Similar to the observations in the last 15 to 20 years, Dunn pointed out that a callus formation at the posterior aspect of the femoral neck is present in most of the cases. This callus formation can neither be seen nor addressed from anteriorly or through a closed reduction maneuver. This can explain the high AVN rate with these techniques, since the typically shortened retinacular vessels in SCFE are stretched and may be occluded when the epiphysis is reduced. He pointed out that a careful subperiosteal preparation of the retinacular vessels with a

resection of the newly formed callus and some neck shortening is the key to preserve the blood supply to the femoral head. Many authors have tried to reproduce Dunn's results. However, they report substantially higher rates of AVN up to 54%, and the technique has not found a wide distribution⁽¹⁾.

In 1991, Carney et al presented their large milestone data from Iowa on various treatments for SCFE. They concluded that pinning in situ has the lowest risk of AVN, which eventually became the treatment of choice even for severe SCFEs. However, there is increasing evidence that the remaining deformities may imply a substantially higher risk of functional hip problems due to femoroacetabular cam-type impingement in the mid- and long-term with premature hip osteoarthritis.

The profound studies on the vascular blood supply to the femoral head in the past 20 years have led to the development of a surgical dislocation of the femoral head with an almost negligible risk of AVN given a correct surgical technique. As an extension of this approach, the retinacular soft tissue flap can reproducibly be developed. This allows full surgical access to the femoral neck and the

epiphysis with visual control of the integrity of the retinacular vessels to the femoral epiphysis. Compared with a standard surgical hip dislocation, the dissection is even closer to the afferent vulnerable blood supply to the femoral epiphysis, which puts the retinacular vessels to a somewhat higher risk of iatrogenic injury. Finally, the modified Dunn technique which is subcapital reorientation through a surgical dislocation of the hip with development of a retinacular soft-tissue flap has been developed ⁽¹⁾.



Aim of the Work

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This study is designed to conduct a rigorous and objective analysis of the current literature evidence of the modified Dunn technique (Subcapital realignment through safe surgical hip dislocation) of unstable SCFE and its clinical outcome and complication rate.