THE UNIVERSITY OF ZAMBIA

SCHOOL OF MEDICINE

DEPARTMENT OF SURGERY

A STUDY TO DETERMINE THE FUNCTIONAL OUTCOMES OF ARTHROSCOPIC SURGICAL MANAGEMENT OF MENISCAL INJURIES VIA THE LYSHOLM KNEE SCALE AT THE ZAMBIAN ITALIAN ORTHOPAEDIC HOSPITAL IN LUSAKA

BY

DR. NACHOR K. BUNDA (BScHB, MBChB – UNZA)

SUPERVISOR:

PROFESSOR OF ORTHOPAEDIC SURGERY
YAKUB MULLA,
BScHB, MBChB, MMED Surgery (UNZA),
ODTS (RCS Eng), MCh.(Orth) Liverpool,
FCS (COSECSA)

A dissertation submitted to the University of Zambia in partial fulfillment of the requirements for the Award of Master of Medicine in Orthopaedic and Trauma Surgery.

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I **Dr. Nachor K. Bunda** hereby declare that this dissertation herein presented for the degree of **Master of Medicine in Orthopaedic and Trauma Surgery** has not been previously submitted either in whole or in part for any other degree at this or any other university, or being currently submitted for any other degree.

Signed: …… **Date:** …….....

Candidate: Dr. Nachor K. Bunda,
(BScHB, MBChB)

Signed: …… **Date:** ……

Supervisor: Prof. Yakub Mulla,
BScHB, MBChB, MMed (Surgery), ODTS (RCS Eng),
MCh (Orth) – Liverpool, FCS (COSECSA)

Signed: …… **Date:** ……

(Head of Department of Surgery, School of Medicine, UNZA)

STATEMENT

I hereby state that this dissertation is entirely the result of my own personal effort. the various sources to which I am indebted have been clearly indicated in the bibliography and acknowledgement.

Signed: …… **Date:** …….....

Candidate: Dr. Nachor K. Bunda,
(BScHB, MBChB)

Signed: …… **Date:** ……

Supervisor: Prof. Yakub Mulla,
BScHB, MBChB, MMed (Surgery), ODTS (RCS Eng),
MCh (Orth) – Liverpool, FCS (COSECSA)

CERTIFICATE OF APPROVAL

This dissertation by **Dr. Nachor K. Bunda** is approved as fulfilling part of the requirement for the award of the **Degree of Master of Medicine in Orthopaedic and Trauma Surgery** by the University of Zambia.

EXAMINERS:

Name: Dr. James Munthali

Signature: _____

Date: _____

Name: Dr. Giorgio Lastroni

Signature: _____

Date: _____

Name: Dr. Mahundo'ona Chowa

Signature: _____

Date: _____

ABSTRACT

BACKGROUND: Arthroscopy is performed to evaluate or treat many orthopaedic conditions of which meniscal injuries are a huge part (Richmond et al, 2009). It is a minimally invasive procedure which is both diagnostic and therapeutic. Meniscal tears are responsible for 750,000 arthroscopies per year in the United States and are the most common soft tissue injury to the knee joint (Rodkey & Steadman, 1999). However, in Zambia, information on arthroscopic surgery of the knee as relates to meniscal injuries has not been well documented, despite its impact on the relief of knee symptoms. This therefore necessitated this study in Zambia.

METHODS: All records of people aged 18 years and above who had undergone arthroscopic surgery of the knee at the Zambian Italian Orthopaedic Hospital due to meniscal injuries within period Jan 2009 to Dec 2013 were reviewed. A total of 37 cases were deemed valid for the study in the given period. The functional outcomes were graded using the Lysholm Knee Scale which is a validated measure of knee stability and is one of the most commonly used knee function scoring systems (Johnson & Smith, 2001). Statistical Package for Social Sciences (SPSS) v16 was applied in data analysis.

RESULTS: The functional outcome of the knee in a total of 37 patients was such that 23 patients (62.2%) were graded as Excellent, 10 patients Good (27.0%), 4 patients Fair (10.8%) and none (0%) were graded as Poor following arthroscopic surgical management of meniscal injuries of the knee.

CONCLUSION: Arthroscopic surgery of the knee is ‘day surgery’ and a short and safe procedure which gives excellent functional outcome and has minimal complications.

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TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

FIGURE/TABLE **PAGE NO.**

LIST OF ACRONYMS

AAOS	-	American Academy of Orthopedic Surgeons
ACL	-	Anterior Cruciate Ligament
LMICs	-	Low and Middle Income Countries
MRI	-	Magnetic Resonance Imaging
OA	-	Osteoarthritis
SPSS	-	Statistical Package for Social Sciences
UNZABREC	-	University of Zambia Biomedical Research Ethics Committee
USA	-	United States of America
USNS	-	United States Naval Ship
VAS	-	Visual Analysis Scale
ZIOH	-	Zambian Italian Orthopaedic Hospital

DEDICATION

This dissertation is dedicated to the late **Dr. Christopher Kasonso** of Konkola Mine Hospital who inspired me to become a medical practitioner and was at the point of commencing his MMED Orthopaedics and Trauma Programme, a venture which was cut short by his untimely death. May his soul rest in eternal peace.

Special dedication also goes to **Mr. Rathindra Nath Das,** a Senior Orthopaedic Surgeon who mentored the late **Dr. Kasonso** at Konkola Mine Hospital and inspired me during my stay in Chililabombwe and got to mentor me later at the Zambian Italian Orthopaedic Hospital during my electives as an undergraduate medical student.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Arthroscopy is a common surgical procedure in which a joint (arthro-) is viewed (-scopic) using a small camera (Richmond *et al*, 2009). Arthroscopic surgery is a minimally invasive surgical procedure in which an examination and sometimes treatment of damage of the interior of a joint is performed using an arthroscope, a type of endoscope that is inserted into the joint through a small incision (Figure 1).

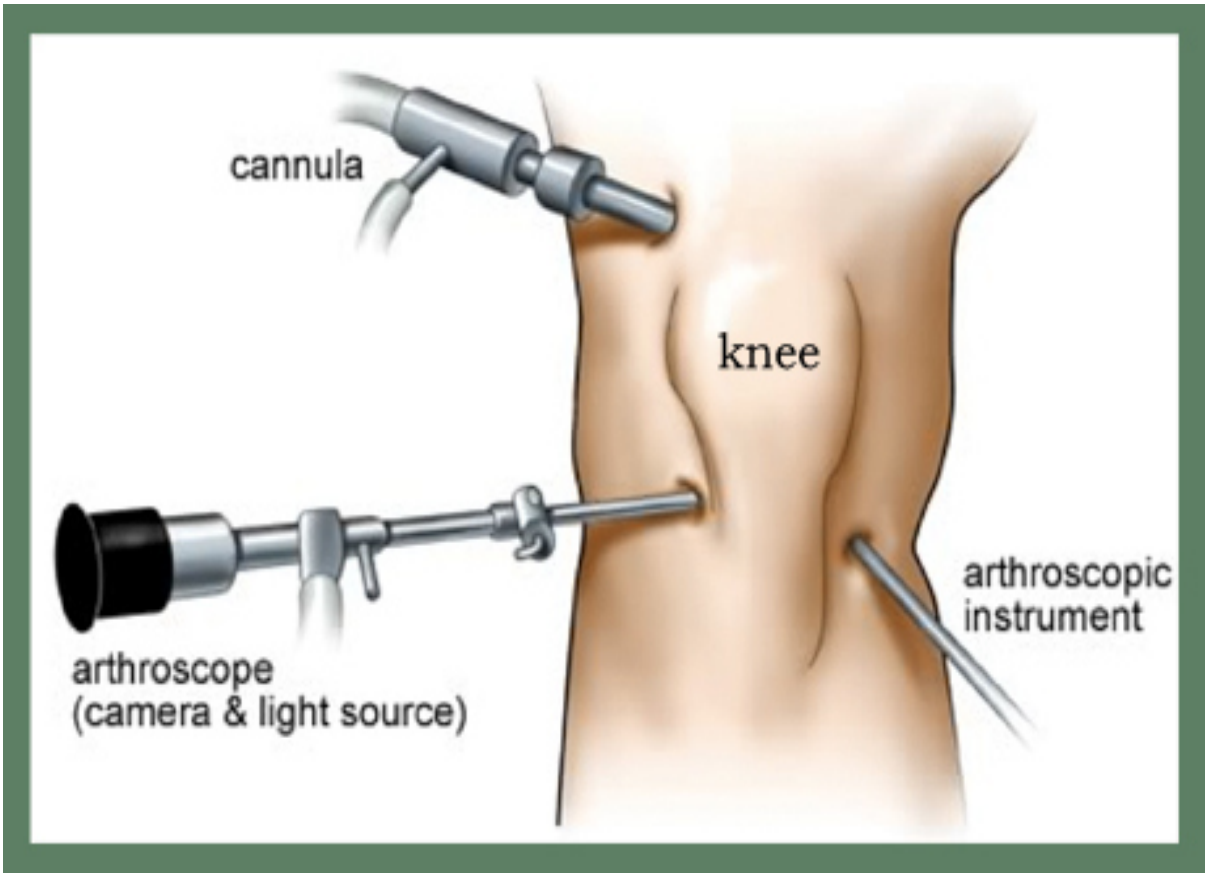

Figure 1

Arthroscopic procedures can be performed either to evaluate or to treat many orthopaedic indications which include torn floating cartilage, torn surface cartilage, anterior cruciate ligament (ACL) reconstruction, torn menisci, osteoarthritis, plica excision, lateral patella release, micro-fracture, autologous chondrocyte implantation and cartilage transfer (Richmond *et al*, 2009).

The word meniscus means ‘‘little moon’’ in Greek, a name evoked by its crescent shape (as seen from above). The menisci sit atop the medial and lateral plateaus of the tibia, contacting the rounded femoral condyles and distributing their weight across a broad surface area. The increased contact area accordingly decreases pressure and focal stress. The menisci aid in lubrication, proprioception and nutrition and also absorb shock; and by acting as a doorjamb, stabilize the joint (Bernstein, 2010). The illustration is as shown in Figure 2.

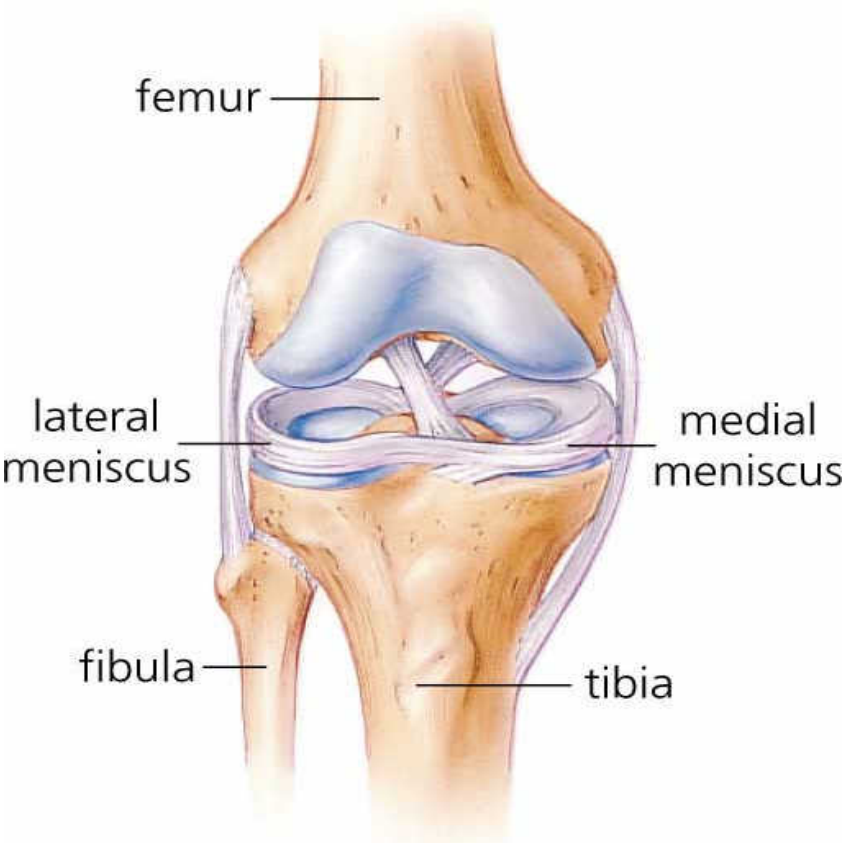

Figure 2

The meniscus is avascular, a fact that has broad implications for treatment: without a blood supply, healing does not occur. Only tears in close proximity to the joint capsule (which is vascular) have good healing potential.

Meniscal tears are described in terms of their geometry as radial, horizontal, and complex. A complex tear being a combination of horizontal and radial tears. A distinctly important configuration is the so-called bucket handle tear in which a large piece of meniscus is torn from the periphery yet anchored at its end. This allows the large meniscal fragment to swing (like the eponymous bucket handle) from its native position and lodge in the notch or under the femoral condyle. In this displaced position, the meniscal fragment can block extension of the knee; moreover, the articular surface and

the meniscal fragment can be damaged by the displaced fragment (Bernstein, 2010). Meniscal tears are as illustrated in Figure 3.

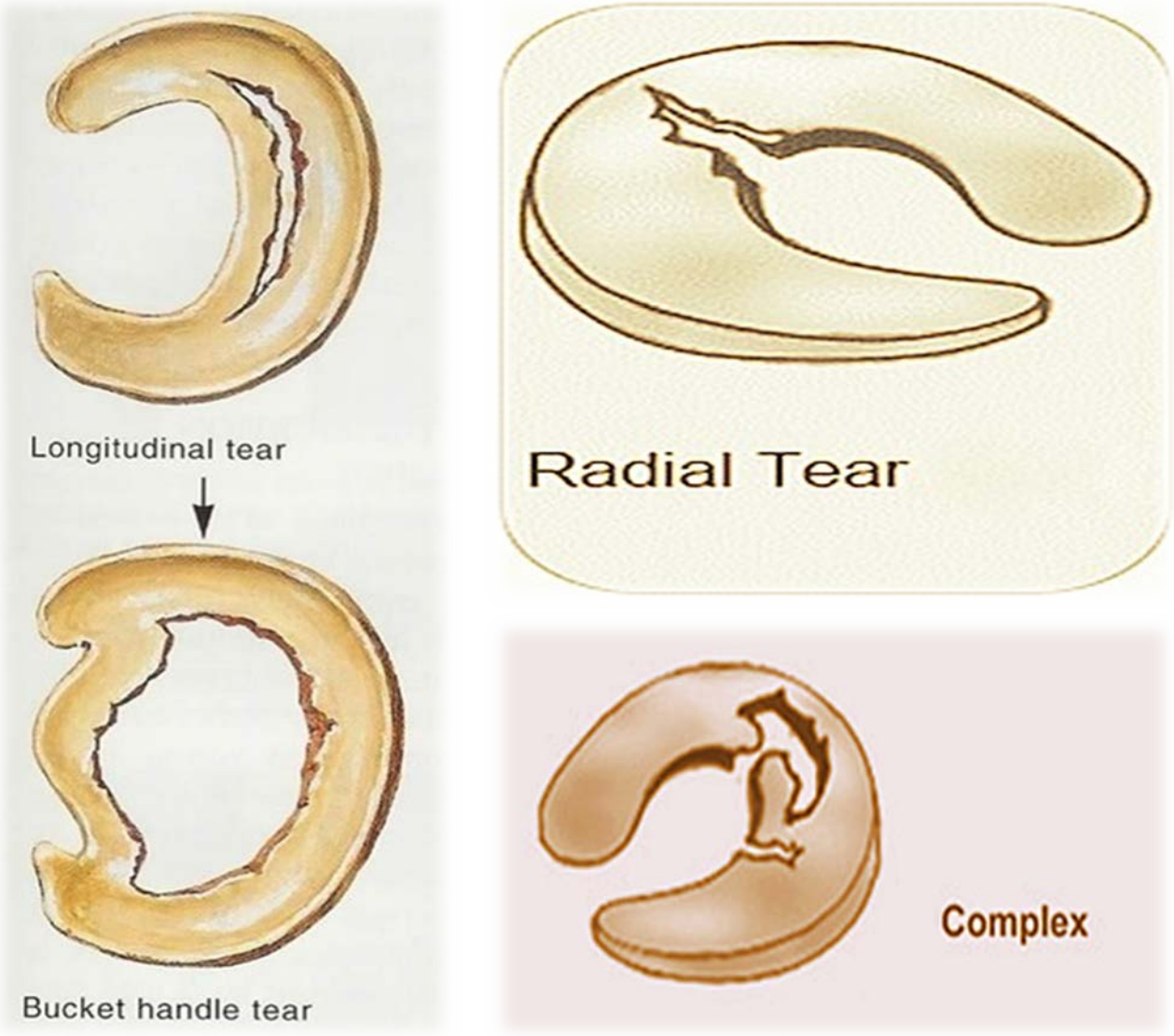

Figure 3

Knee arthroscopy can be done under general, regional, or local anaesthesia. The length of the knee arthroscopy procedure varies depending on what the doctor needs to accomplish. After surgery, the knee is wrapped in a soft bandage. Depending on the type of surgery performed, the doctor may or may not allow the patient to place weight on the affected leg. Most patients will work with a physical therapist to regain motion and strength of the joint. The length of rehabilitation will also vary depending on what procedure is performed at the time of surgery (American Academy of Orthopedic Surgeons, 2012).

The advantage of arthroscopy over traditional open surgery is that the joint does not have to be opened up fully. Instead, for knee arthroscopy for example, only two small incisions are made, one for the arthroscope and one for the surgical instruments to be used in the knee cavity. This reduces recovery time and may increase the rate of surgical success due to fewer traumas to the connective tissue. It is especially useful for professional athletes, who frequently injure knee joints and require fast healing time. There is also less scarring, because of the smaller incisions. Irrigation fluid is used to distend the joint and make a surgical space. Sometimes this fluid extravasates into the surrounding soft tissue, causing edema.

The surgical instruments used are smaller than traditional instruments. Surgeons view the joint area on a video monitor, and can diagnose and repair torn joint tissue, such as ligaments and menisci or cartilage.

It is technically possible to do an arthroscopic examination of almost every joint in the human body. The joints that are most commonly examined and treated by arthroscopy are the knee, shoulder, elbow, wrist, ankle, foot, and hip.

Professor Kenji Takagi in Tokyo has traditionally been credited for performing the first arthroscopic examination of the knee joint of a patient in 1919. He used a 7.3 mm cystoscope for his first arthroscopies. Recently it has been discovered that the Danish physician Severin Nordentoft reported on arthroscopies of the knee joint as early as 1912 at the "Proceedings of the 4lst Congress of the German Society of Surgeons at Berlin" (Kieser *et al,* 2001). He baptized the procedure (in Latin) *arthroscopia genu*. Nordentoft used sterile saline or boric acid solution as his optic media and entered the joint by a portal on the outer border of the patella. However, it is not clear if these examinations were anatomic studies of deceased or of living patients.

Pioneering work in the field of arthroscopy began as early as the 1920s with the work of Eugen Bircher who published several papers in the 1920s about his use of arthroscopy of the knee for diagnostic purposes. After diagnosing torn tissue through arthroscopy, Bircher used open surgery to remove or repair the damaged tissue. Initially, he used an electric Jacobaeus thoracolaparoscope for his diagnostic procedures, which produced a dim view of the joint. Later, he developed a double-contrast approach to improve visibility. Bircher gave up endoscopy in 1930, and his work was largely neglected for several decades (Kieser & Jackson, 2003).

While Bircher is often considered the inventor of arthroscopy of the knee (Boni, 1996), the Japanese surgeon Masaki Watanabe, MD, receives primary credit for using arthroscopy for interventional surgery (Watanabe, 1983 & Jackson, 1987). Watanabe was inspired by the work and teaching of Dr. Richard O'Connor. Later, Dr. Heshmat

Shahriaree began experimenting with ways to excise fragments of menisci (Metcalf, 1985).

According to literature by Allen & Shahriaree (1982), the first operating arthroscope was jointly designed by these men, and they worked together to produce the first high-quality color intra-articular photography. The field benefited significantly from technological advances, particularly advances in flexible fiber optics during the 1970s and 1980s.

Arthroscopy continues to grow in popularity as a treatment modality for orthopaedic pathologies of all age groups. In recent years, arthroscopic procedures previously reserved for adult patients have become more frequently used in the treatment of younger individuals as well (Siparsky & Kocher, 2009). The knee is by far the most frequently implicated joint in arthroscopy, partly due to a rise in sports injuries (Accadbled, 2010).

The essence of this study was to determine the functional outcomes of arthroscopic surgical management of meniscal injuries of the knee at the Zambian Italian Orthopaedic Hospital (ZIOH) in Lusaka from January 2009 to December 2013.

CHAPTER TWO

2.0 LITERATURE REVIEW

The role of arthroscopy in the pre-conflict deployment of a large number of military troops is not well defined. Between September 1990 and January 1991, while deployed to the Persian Gulf for Operation Desert Shield, 73 patients underwent on-board elective arthroscopy on the United States Naval Ship (USNS) Mercy. There were 71 men and two women with an average age of 27 years (range 19–47). Indications for arthroscopy included clinical diagnosis of meniscus tear, acute hemarthrosis, chronic effusion, and intra-articular loose body. Findings at the time of arthroscopy included 34 patients (47%) with meniscus tears; 17 (23%) with anterior cruciate ligament tears; five (7%) with isolated grade II–IV chondromalacia involving the patella, trochlea, femoral condyles, or tibial plateaus; six (8%) with synovitis; four (5%) with osteochondritis dissecans of the medial femoral condyle; two (3%) with a medial retinacular tear secondary to patella dislocation; and 10 (14%) with normal arthroscopic examinations. Forty-nine patients (66%) were returned to duty at an average of 6 days postoperatively, obviating the need to evacuate these patients from the Middle East theatre (Steven et al, 1992).

A study on the epidemiology of knee injuries in Australia was reviewed. A 10-year retrospective analysis of all knee injuries recorded in the medical log was undertaken. Meniscal tears contributed to 11% of the recorded injuries (McGaughey & Sullivan, 2003).

In a study in Germany by Zeichen et al. (2006), excision of damaged meniscal tissue was done whereby the mechanical obstacles to joint movement were eliminated. As much functional, intact meniscal tissue as possible was retained. 88% of 146 patients with stable knee joints had a very good or good result 14.7 years after partial meniscectomy. 95% of 57 patients were satisfied or very satisfied with the result 12 years after partial medial meniscectomy. It was concluded that very good and good clinical results can be achieved in the short and long term after arthroscopic partial meniscectomy.

Arthroscopic surgery was performed in Greece on 314 (83.1%) knees in the acute phase (< 6 weeks) of injury and on 64 (16.9%) knees more than 6 weeks after injury for a total of 364 athletes (378 knees). Overall, 262 of 378 tears (69.3%) were located in the medial meniscus and 116 (30.7%) in the lateral meniscus. Vertical tears (77.5%) were significantly more frequent than were horizontal tears (22.5%; chi test, $P < .001$). A total of 23.2% of tears involved the peripheral zones (zone 0 or 1), and tears that extended into the posterior horn accounted for 75.7%. Regarding the tear shape between male and female athletes, on both sides there were no statistically significant differences in the percentage of horizontal, bucket-handle, longitudinal, or radial tears. It was concluded that the characteristics of isolated meniscal tears differ with regard to the sport, sex, and tear location and type from those seen in unstable knees and that this knowledge is useful in knee injury management (Terzidis et al, 2006).

A study by Chen et al. (2007) concluded that there were many benefits of both diagnostic and therapeutic arthroscopic surgery as it avoids the morbidities associated with an open technique. The listed benefits were as follows:

- Arthroscopic repair that obviates the need for capsulotomy may be able to decrease the risk of post-operative wound drainage.
- Intra-articular sinus formation is reduced.
- Infection and stiffness that may accompany a capsulotomy or any other form of knee surgery is unlikely.
- The potential of avoiding a lateral knee incision potentially decrease peroneal nerve injury.
- Arthroscopic visualization allows the surgeon to safely avoid injuring the geniculate arteries during surgery.
- Also because of the popliteus footprints' close proximity to the origins of lateral collateral ligament, arthroscopic visualization is in most cases better than open visualization of the footprint which may allow for a more precise anatomic repair.

Return to activity has been poorly quantitated in knee arthroscopy. To test the hypothesis that most patients return to unrestricted activity within 4 weeks of knee arthroscopy. A prospective power analysis of 72 consecutive patients in the United States of America underwent arthroscopic knee partial medial meniscectomy, partial lateral meniscectomy, chondroplasty, loose body removal or synovectomy (or some combination thereof) by a single surgeon. Post-operatively 88% of patients described knee related activity restriction. By 2 weeks post-operatively, only 74% described knee related activity restrictions. This improved to 38% at 4 weeks, and was only 4% at 20 weeks. In addition 82% returned to light activities after 1 week, with 94% after 2 weeks and 100% after 4 weeks, therefore supporting the hypothesis (James et al, 2008).

A study by Hong *et al.* (2012) aimed to investigate the short-term clinical outcomes of arthroscopic meniscectomy for the treatment of discoid lateral meniscus tears. They diagnosed and treated 42 patients (47 knees) with discoid lateral meniscus tears using arthroscopy between February, 2007 and December, 2010. Thirty-seven knees received partial resection of the discoid meniscus, 8 received hypo-complete resection and 2 received complete resection. Thirty-nine of the patients were followed up for a mean of 21 months (ranging from 9 to 53 months). The Lysholm scoring system was used to assess the knee function prior to surgery and during the follow-up. The results were analyzed using a Student's t-test with Statistical Package for Social Sciences (SPSS) version 12.0. The study showed that patients with treated knees returned to normal activities within 4–6 weeks, and knee functions were more improved at 9 months after operation than 3 months, as measured by the Lysholm score ($P<0.05$). It was concluded that arthroscopic meniscectomy is an effective treatment for discoid menisci resulting in minimal invasion, quick recovery and early functional exercise. The use of arthroscopy during surgery aids to preserve the meniscus and to reduce stress, therefore, having a beneficial effect on short-term clinical outcomes.

According to a study by Figueroa et al. (2012) in Chile, complications of arthroscopic knee surgery included infection, swelling, and blood clots in the leg. Complications were unusual after knee arthroscopy, and while they were a cause for concern, knee arthroscopy was considered a low-risk surgical procedure.

A retrospective study by Owoeye, et al. (2008) which was aimed at investigating the nature and distribution of sports injuries reported by athletes to the National Sports Medicine Centre in Lagos from January 1995 to December 2002 was conducted in

Nigeria. Participants in this study were athletic patients in six selected sports, namely; track and field, volleyball, hockey, handball, basketball and football. A total number of 171 sports injuries were obtained at the general records unit of the sports medicine centre with a male to female ratio of 2:1. The knee was reported as the most injured body part in handball (21.6%), basketball (21.6%) and football (27.0%). The study showed that 14.3% of injuries in track and field were meniscal injuries and furthermore, 28.6% of all injuries in handball, basketball and football were meniscal injuries in each regard. There were no meniscal injuries of the knee recorded in volleyball and hockey.

Wakamuke et al. (2009) of Uganda at Mulago Hospital stated that an average of 432 patients with knee joint disorders were seen in orthopaedic and rheumatology outpatient clinics out of a total of 5400 patients annually. The sonographic pattern of knee joint pathology at this hospital out of 107 patients with knee complaints was determined. It was observed that 51 office workers (47.7%) had more knee disorders compared to 43 manual labourers (40.2%). There was a high prevalence of knee disorders among individuals of working age compared to 13 children and students (12.1%). The clinical diagnoses of haemothrosis, meniscal tears and pyogenic arthritis each were recorded in 6 (5.6%) cases. Furthermore, it was found that three (2.9%) cases of meniscal tears which were recorded in this study were as a result of a fall on the knee. Reports revealed that the majority of patients with meniscal tears were in their 20s. Meniscal injuries were seen to be associated with sporting activities especially soccer and rugby and with occupational kneeling and squatting.

A study in South Africa by Karachalios et al. (2005) on standard clinical tests to diagnose meniscal tears in the knee was carried out. 213 patients with symptomatic knee injuries

were enrolled and examined using the McMurray test, the Apley compression and distraction test, the Thessaly test at 5^o and also 20^o flexion of the knee. It was concluded that the Thessaly test at 20^o knee flexion had the highest clinical diagnostic accuracy for the detection of meniscal tears but was still less accurate than Arthroscopic evaluation or Magnetic Resonance Imaging (MRI) studies.

There are no documented studies on Arthroscopic management of meniscal injuries of the knee in Zambia.

2.1 STUDY JUSTIFICATION

According to Briggs et al. (2006), a torn meniscus is one of the most common indications for knee surgery. Meniscal tears are responsible for 750,000 arthroscopies per year in the US and are the most common soft tissue injury to the knee joint (Rodkey & Steadman, 1999). In Zambia, cases of arthroscopic surgery of the knee have not been well documented despite its impact on the relief of knee pain of various causes, both at individual and society levels.

One study by Goodyear-Smith & Arroll (2001) found that physiotherapy was beneficial for regaining muscle strength and on pain assessment but that it did not translate into functional improvement. They recommended that descriptive studies were required to ascertain the types and duration of treatments being offered to patients after arthroscopic meniscectomy and that further research is needed to perform well designed studies of current treatments that take into account predisposing factors and their impact on outcome.

Seeing that arthroscopic management of meniscal injuries is an everyday practice in the Western world, it is anticipated that the trend will be adopted in Low to Middle Income Countries (LMICs) in the near future seeing that such injuries equally occur there especially due to a rise in sports activities. In this respect, a local study on such surgery as currently being practiced in Zambia would avail vital information from which extrapolation of the same would provide direction to a wider scale of such surgical practice in the country.

Knowing the functional outcomes of arthroscopic meniscal surgery of the knee would help in the formulation of effective and proper policies for the provision of health care to those who are affected by various knee pains that may be relieved by such procedures.

2.2 RESEARCH QUESTION

What are the functional outcomes of arthroscopic management of meniscal injuries of the knee at the Zambian Italian Orthopaedic Hospital in Lusaka?

2.3 GENERAL OBJECTIVE

- To determine the functional outcomes post arthroscopic surgery of the knee in patients with meniscal injuries at the Zambian Italian Orthopaedic Hospital in Lusaka.

2.4 SPECIFIC OBJECTIVES

1. To determine the common clinical presentation of individuals with meniscal injuries at the Zambian Italian Orthopaedic Hospital in Lusaka.
2. To establish the consistency between the clinical diagnosis and the arthroscopic intra-op findings as relates to meniscal injuries.
3. To establish the commonest patterns of meniscal injuries presenting at the Zambian Italian Orthopaedic Hospital in Lusaka as confirmed by arthroscopic findings.
4. To determine the benefits of arthroscopic management of meniscal injuries of the knee.
5. To establish the risks of arthroscopic management of meniscal injuries of the knee and complications thereof.

CHAPTER THREE

3.0 METHODOLOGY

3.1 STUDY SETTING

The study was conducted at the Zambian Italian Orthopaedic Hospital (ZIOH) a part-private, part-charity hospital in Lusaka, as this institution had the relevant equipment and had been carrying out such procedures frequently. More so, the institution carried out consistent, standard and adequate documentation for each patient, on all the relevant aspects of information required for this specific study as opposed to other institutions in Lusaka.

3.2 STUDY DESIGN

This study was retrospective, cross-sectional and descriptive. Sim *et al.* (2002) report that this type of design is useful in gaining more information about a particular characteristic.

There were limited number of such procedures being undertaken in Zambia and thus a prospective study would have yielded very few cases which as a result would have led to an invalid conclusion. A retrospective approach was therefore preferred due to the fact that a significant number of such procedures were carried out cumulatively over the past years and with accurate and sufficient data entry at ZIOH. This therefore provided a rich reservoir from which the required information for the study was obtained. Utilization of such information from a retrospective approach therefore resulted in a more valid and significant conclusion.

3.3 STUDY POPULATION AND SAMPLING PROCEDURE

The population and size in the study included all records of all people, male and female, aged 18 years and above who had undergone arthroscopic surgery of the knee at ZIOH due to meniscal injuries within the period January 2009 to December 2013.

Here, all validated cases of interest falling within the given period were picked.

3.4 SAMPLE SIZE

Using the formula $\mathbf{N=\frac{Z^2 x\ P(1-P)}{(E)^2}}$ the desired sample size was **150.**

Where:

N= Sample required

Z= 1.96 (Statistic for level of confidence i.e. 95% Confidence Interval)

P= 0.11 (Expected prevalence of condition under study)

E= 0.05 (Confidence Interval. Refers to accuracy range +/- 5%)

However, **37** cases were validated for this study.

3.5.0 INCLUSION AND EXCLUSION CRITERIA

3.5.1 INCLUSION CRITERIA

The study included records of people who had undergone arthroscopic surgery of the knee at ZIOH due to meniscal injuries within the period January 2009 to December 2013. Records of all males and females aged 18 years and above were included in the study.

3.5.2 EXCLUSION CRITERIA

- All records of patients with meniscal injuries managed by arthroscopy as well as open surgery.
- All cases that had incomplete information of interest as required in the data collection sheet (see Appendix I).
- All cases of meniscal injuries with co-existing significant injuries affecting stability of the knee.

3.6 DATA COLLECTION TECHNIQUES

This study utilized patients' medical records. Data was collected using a record review checklist also known as a data capture sheet which was appropriate for the study design. The Lysholm scoring system which is a validated measure of knee disability and is one of the most commonly used knee function scoring systems (Johnson & Smith, 2001) was used in determination of the functional outcome at 3 months post-surgery (refer to Appendix II). It was the preferred scoring tool in this research as it was designed specifically for assessment of function of the knee and is easily applicable to short term studies. Furthermore, the Lysholm Knee Scale is widely used by orthopaedic surgeons across the world in studies relating to the knee and was therefore favoured in this study as opposed to the International Classification of Function (ICF) which is a generalized scale and would have been difficult to apply accurately as relates to knee function.

3.7.0 VARIABLES

3.7.1 INDEPENDENT VARIABLES

- Age
- Sex
- Occupation
- Mechanism of injury

3.7.2 DEPENDENT VARIABLES

- Limp
- Knee locking
- Pain
- Swelling
- Knee instability

3.8 DATA ANALYSIS

The data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 16. The collected data was loaded into the statistical program for processing. Frequency tables for all the variables were given to demonstrate the distribution of variables. Descriptive statistics were utilized to analyze the data.

3.9 ETHICAL CONSIDERATIONS

Approval to conduct the study was obtained through the University of Zambia Biomedical Research Ethics Committee (UNZABREC). As this was a record review of patient records, a waiver of full ethics review was sought. Permission was granted by ZIOH management to conduct the study at their institution.

Patients' records were treated with utmost confidentiality and case numbers were used instead of patients' actual names.

CHAPTER FOUR

4.0 RESULTS

This chapter presents the findings of the study. The main objective of this study was to determine the functional outcomes post arthroscopic surgery of the knee in patients with meniscal injuries at the Zambian Italian Orthopaedic Hospital (ZIOH) in Lusaka.

Cases: n = 37

Table 1: Arthroscopic Intervention

Arthroscopic Intervention	Frequency	Percent
Partial Meniscectomy	37	100
Total Meniscectomy	0	0
Total	**37**	**100**

There were thirty-seven participants, all of whom experienced meniscal injuries. Table 1 shows that all 37 (100%) individuals underwent partial meniscectomy as the main arthroscopic intervention for this injury and none (0%) underwent total meniscectomy.

Table 2: Biographical Characteristics of Participants

Variable	Values	Frequency	Percentage
Gender	Males	34	91.9
	Females	3	8.1
Age	18-29	15	40.5
	30-39	11	29.7
	40-49	7	18.9
	50-59	2	5.4
	>59	2	5.4

Table 2 presents the biographical background of the thirty-seven participants. Thirty-four (91.9%) were males and three (8.1%) were females. Fifteen (40.5%) were aged 18-29 years, 11 (29.7%) were aged 30-39 years, 7 (18.9%) were aged 40-49 years, two (5.4%) were aged 50-59 years, and another two (5.4%) were aged above 59 years.

Table 3: Mechanism of Injury

Mechanism of Injury	Frequency	Percentage
Sport Related	22	59.5
Fall (Outside Sport)	10	27.0
Spontaneous	1	2.7
Unspecified	4	10.8
Total	**37**	**100.0**

Table 3 presents additional findings which were that 22 (59.5%) of the injuries presented at ZIOH were sport related, 10 (27.0%) were due to a fall outside sport, and 1 (2.7%) was spontaneous. 4 (10.8%) injuries were unspecified

Table 4: Clinical Presentation

Clinical Presentation	Frequency	Percent
Pain Only	7	18.9
Knee Locking Only	2	5.4
Pain and Swelling/Effusion	6	16.2
Pain and Knee Locking	7	18.9
Pain, Swelling/Effusion and Knee Locking	15	40.5
Total	**37**	**100.0**

The first objective aimed at determining the common clinical presentation of the participants with meniscal injuries at ZIOH. Table 4 reveals that 7 (18.9%) of the patients presented with pain only, 2 (5.4%) presented with knee locking only, 6 (16.2%) presented with pain and swelling/effusion, 7 (18.9%) presented with pain and knee locking, and 15 (40.5%) presented with pain, swelling/effusion and knee locking.

Table 5: Tourniquet Use and Instruments Used

Variable	Values	Frequency (n=37)	Percent
Tourniquet use	Yes	37	100.0
Instruments	Rigid	37	100.0
Closure	Non-Absorbable Suture	37	100.0

A tourniquet was used in all the 37 cases (Table 5). Rigid instruments were equally used in all the 37 cases. Closure was with non-absorbable suture.

Table 6: Presence of Foreign Bodies, Debris and Loose Bodies

Variable	Values	Frequency (n=37)	Percent
Foreign Bodies	Present	1	2.7
	Absent	36	97.3
Debris	Present	17	45.9
	Absent	20	54.1
Loose Bodies	Present	1	2.7
	Absent	36	97.3

Foreign bodies were present only in one case (Table 6); debris were present in 17 (45.9%) cases and loose bodies were present only in one case.

Table 7: Clinical Diagnosis

Clinical Diagnosis	Frequency	Percent
Meniscal Injury	30	81.1
Other	7	18.9
Total	**37**	**100.0**

Table 7 shows that in 30 cases (81.1%), the clinician accurately diagnosed meniscal injuries clinically and thus was consistent with arthroscopic findings yet in seven cases (18.9%), the clinician made a diagnosis other than what was found upon arthroscopy.

Table 8: Arthroscopic Findings of Meniscal Tear Pattern

Meniscal Tear Pattern	Frequency	Percent
Bucket Handle (Longitudinal)	14	37.8
Radial Type	13	35.1
Complex Type	0	0.0
Unspecified	10	27.0
Total	**37**	**100.0**

Table 8 shows that the commonest patterns of meniscal injuries that presented at ZIOH were: bucket handle 14 (37.8%), radial type 13 (35.1%) and complex type none (0%). Meniscal tears that were unspecified accounted for 10 cases (27%).

Table 9: Meniscus Involved

Meniscus Involved	Frequency	Percent
Medial Meniscus	20	54.1
Lateral Meniscus	17	45.9
Total	**37**	**100.0**

Meniscus involved: medial meniscus 20 cases (54.1%) and lateral meniscus 17 (45.9%) (Table 9).

Table 10: Tourniquet Duration

Variable	Values	Frequency (n=37)	Percent
Tourniquet Duration	<30mins	1	2.7
	30-59mins	31	83.8
	60-119mins	4	10.8
	>119mins	1	2.7
Total		**37**	**100**

Table 10 shows that the tourniquet time duration for the procedure was <30mins for 1 patient (2.7%), 30-59mins for 31 patients (83.8%), 60-119mins for 4 patients (10.8%) and >119mins for 1 patient (2.7%).

Table 11: Duration of Hospital Stay

Duration of Hospital Stay (Days)	Frequency	Percentage
Zero	36	97.3
One or More	1	2.7
Total	**37**	**100**

Table 11 shows that 36 (97.3%) patients involved in the study had been discharged the same day they were admitted in the hospital whereas 1 (2.7%) patient was discharged the following day.

Table 12: Outcomes at 3 Months Post-Surgery via Lysholm Knee Score

Outcome	Frequency	Percent
<65 (Poor)	0	0
65-83 (Fair)	4	10.8
84-90 (Good)	10	27.0
>90 (Excellent)	23	62.2
Total	**37**	**100.0**

Table 12 shows that the outcomes at three months post arthroscopic surgery via Lysholm knee score were: 23 (62.2%) excellent, 10 (27.0%) good and 4 (10.8%) fair. No patient had a poor outcome.

Table 13: Complications

Complication	Frequency	Percentage
Excessive Haemorrhage	0	0
Significant Damage to Key Structures	0	0
Infection	0	0
No Significant Complications	37	100
Total	**37**	**100**

As shown in Table 13, there were no significant complications noted in all the 37 cases.

CHAPTER FIVE

5.0 DISCUSSION

This retrospective study done at ZIOH, Lusaka to determine the functional outcomes of arthroscopic management of meniscal injuries of the knee has shown that outcome at three months post arthroscopic surgery via Lysholm Knee Score was such that 23 patients (62.2%) were excellent, 10 patients (27.0%) were good, 4 patients (10.8%) were fair and none were poor.

This study had several limitations which included the fact that only one hospital in Zambia had been consistently doing arthroscopy and keeping good records thereof. Certain other hospitals had the capacity to do arthroscopy and had been doing so for a while but stopped the procedure due to technicalities. The fact that only one hospital could be relied on for a study vis-à-vis arthroscopic surgery meant that there was a limitation in the number of cases thus a retrospective study was necessitated. However, even a five-year review in this regard could not realize the targeted number of cases (i.e. 150). Another limitation was that certain records had incomplete data of interest and were therefore excluded. Nonetheless, the number of cases gathered from this study at ZIOH (i.e. 37) created an opportunity for this study to be carried out.

All 37 cases of meniscal injuries were managed by arthroscopic partial meniscectomy. No patient underwent total meniscectomy or meniscal repair or implantation with an artificial meniscus.

5.1 BIOGRAPHICAL CHARACTERISTICS OF PARTICIPANTS

The study revealed that 34 males (91.9%) and 3 females (8.1%) were involved. The male predominance as relates meniscal injuries of the knee was found to be consistent with results in a study by Owoeye et al. (2008). This presentation can be attributed to the fact that males are more inclined to vigorous activities than females thus making them more prone to meniscal injuries.

The age group 18-29 years (40.5%) was mostly involved, this was consistent with the results in a study by Wakamuke (2009) where the most involved participants were those in the 20s age group. This could be explained by the fact that this is a young and active age group thus making it more likely to be involved in more activity including that of a vigorous nature.

5.2 MECHANISM OF INJURY

Findings of the study were that 59.5% (22 cases) of the injuries presented at ZIOH were sport related, 27% (10 cases) were due to a fall outside sport, 2.7% (1 case) were spontaneous and 10.8% (4 cases) of the injuries were unspecified. This was consistent with the results in a study by Accadbled (2010) in which sportsmen and women were the most implicated. The higher incidence of sport related injuries can be attributed to the fact that sportsmen and women tend to engage in full contact activities which predispose them to traumatic events. Furthermore, certain sporting activities such as soccer, basketball, rugby and athletic activities tend to involve motions such as jumping high up, ultimately landing onto the ground and suddenly turning thereby twisting in an attempt to beat an opponent to the task or the ball thus increasing the risk of sustaining meniscal

injuries of the knee. This is as a result of combined forces of axial loading and twisting effect on the knee.

The attribution of higher numbers to sport related cases can be due to health seeking behaviour. To be more specific, professional sportsmen and women are more likely to seek medical attention following a knee injury in order for them to get back to a full functional state and thus continue earning a living through sport. Similarly, unprofessional sportsmen and women may seek medical attention in order to ensure that they continue engaging in sporting activities as a way of keeping fit, having fun off regular work, passing time or indeed enjoying the competitiveness of such activities thereof.

The second highest frequency in this regard was as a result of a fall which was unrelated to sporting activities. Such events range from tripping and falling from a height such a stairs or a roof to slipping on a relatively flat surface such as a floor during daily activities. Here, though such events may be common in society, fewer are likely to seek medical attention for so long as they can still go on with their daily activities and earn a living from their regular jobs as opposed to sportsmen and women.

Those who had meniscal injuries without any prior significant cause were few as chances of this kind of event are known to be slim. Four cases were considered unspecified in the sense that it was not stated exactly what led to their injury.

5.3 CLINICAL PRESENTATION

The first objective of the study was to determine the common clinical presentation of the participants with meniscal injuries at ZIOH. Findings of the study revealed that 7 (18.9%) of the patients presented with pain only, 2 (5.4%) presented with knee locking only, 6 (16.2%) presented with pain and swelling/effusion, 7 (18.9%) presented with pain and knee locking, and 15 (40.5%) presented with pain, swelling/effusion and knee locking. A study by Strobel (2009) had similar findings where the majority of affected individuals had a combined presentation of pain, swelling/effusion and knee locking. This can be due to the fact that various mechanical movements are involved in the sustaining of such injuries thus creating a significant degree of knee injury ultimately presenting with the combined clinical features in question.

5.4 TOURNIQUET USE, DURATION AND INSTRUMENTS USED

A tourniquet was used in all 37 cases as expected as a blood free field is required for the procedure. The majority of cases occurred within a duration of 30-59 minutes (i.e. 83.8%) thus implying that it is a relatively short procedure in general. Oschner (2000) equally deduced that it was a short procedure. However, there is a possibility that this could be attributed to the competence of the practitioners and not just the nature of the procedure itself. The instruments used were rigid in nature.

5.5 PRESENCE OF FOREIGN BODIES, DEBRIS AND LOOSE BODIES

The study revealed that foreign bodies were found in 1 patient (2.7%) and that no foreign bodies were found in 36 patients (97.3%). Debris was present in 17 patients (45.9%) whereas there was no debris present in 20 patients (54.1%). Loose bodies were present in 1 patient (2.7%) whereas there were no loose bodies in 36 patients (97.3%).

5.6 CLINICAL DIAGNOSIS AND CONSISTENCY WITH ARTHROSCOPIC FINDINGS

The findings of the study revealed that in 30 cases (81.1%), the clinician accurately diagnosed meniscal injuries clinically and thus was consistent with arthroscopic findings yet in 7 cases (18.9%), the clinician made a diagnosis other than what was found upon arthroscopy.

In other words, all the 37 cases involved meniscal injuries as confirmed by arthroscopy. However, in the pre-arthroscopic clinical assessment upon examination, the medical practitioners in question were able to correctly diagnose 30 (81.1%) of the cases as meniscal injuries and made other diagnoses for the other 7 (18.9%) cases. This demonstrated a remarkably accurate clinical ability amongst the practitioners as regards diagnosing meniscal injuries. It was noted nonetheless that most records did not specify the actual clinical examination test that was used to come up with the said clinical diagnosis.

Karachalios et al. (2005) had similar findings as regards practitioner competence of clinically diagnosing meniscal injuries. However, his study specified the clinical maneuverers used, that is the McMurray test, Apley compression and distraction test and Thessaly tests at 5° and also 20° flexion of the knee. The Thessaly test at 20° flexion of the knee was seen to be the most accurate.

5.7 ARTHROSCOPIC FINDINGS OF MENISCAL TEAR PATTERN AND MENISCUS INVOLVED

The findings of the study showed that the commonest patterns of meniscal injuries that presented at ZIOH were: bucket handle 14 cases (37.8%), radial type 13 cases (35.1%)

and complex type, no cases (0%). 10 cases (27%) of the meniscal injuries were unspecified. Menisci involved were medial meniscus 20 cases (54.1%) and lateral meniscus 17 cases (45.9%).

The pattern of meniscal injuries as observed in this study revealed a higher incidence of bucket handle type of injuries as opposed to radial type which was consistent with a study by Ververidis (2006). In the study at ZIOH, it was observed that the records were not as specific in terms of the sub-types of these injuries. Furthermore, some arthroscopy records did not even describe what type of injury was encountered but generally stated the injury as "meniscal tear" and therefore this was denoted as "unspecified".

Medial meniscal injuries were more common than lateral meniscus injuries which too was a consistent finding with literature across the globe such as the Terzidis et al. (2006) study findings.

Medial meniscal tears are known to be more symptomatic than lateral meniscal tears thereby possibly creating a situation where those with medial meniscal injuries are more likely to seek medical attention thus potentially explaining the higher numbers of such recorded cases.

5.8 DURATION OF HOSPITAL STAY AND OUTCOME AT 3 MONTHS POST -SURGERY VIA LYSHOLM KNEE SCORE

Findings of the study revealed that 36 out of 37 patients (97.3%) who came in for arthroscopic surgery were operated on and went home the same day. All the patients that went home the same day were discharged within 3 – 5 hours of having been operated on, probably partly due to the type of anaesthesia given. Only one patient (2.7%) stayed until

the following day. In this regard, this procedure can be denoted “day surgery”. Oschner (2000) had similar findings.

The study also revealed that the functional outcomes of arthroscopic management of meniscal injuries of the knee at three months post arthroscopic surgery via Lysholm Knee Score were 23 patients (62.2%) excellent, 10 patients (27.0%) good, 4 patients (10.8%) fair and none poor. This was consistent with Zeichen et al. (2006) study where the majority had an excellent outcome as determined by the Lysholm Knee Scale.

5.9 RISKS OF ARTHROSCOPIC MANAGEMENT OF MENISCAL INJURIES OF THE KNEE AND COMPLICATIONS THEREOF

According to the findings in the study, there were no significant complications recorded in all 37 cases. A study by Figueroa et al. (2012) in Chile showed complications of arthroscopic knee surgery to include infection, swelling, and blood clots in the leg. However, knee arthroscopy was still considered a low-risk surgical procedure.

The results of this study having found that there were no significant complications in any of the cases that underwent arthroscopic management of meniscal injuries, shows that this surgery is indeed a low-risk procedure.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

1. Males and 18-29 age group are mostly affected with most meniscal injuries being sport related. Most patients present with combination of pain, swelling/effusion and knee locking.
2. Practitioners have a high ability to diagnose meniscal injuries clinically.
3. Bucket handle meniscal tears are the commonest tear pattern and the commonest meniscal tear location is on the medial side.
4. The benefits of this surgery are that it is a short procedure, is ‘day surgery’, a safe procedure and gives excellent functional outcome.
5. This procedure has minimal complications.

6.2 RECOMMENDATIONS

- The Lysholm Knee Scale must be incorporated as a standard form in the assessment of functional outcomes following meniscal injuries.
- Orthopaedic practitioners must state the clinical maneuvers used in the making of meniscal injury diagnoses.
- Arthroscopic management of meniscal injuries should be adopted in all major hospitals in Zambia.
- Arthroscopic equipment should be made available across all key hospitals in Zambia.
- More Orthopaedic Surgeons must be trained and involved in Sports Medicine and arthroscopic surgical techniques across Zambia.

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APPENDICES

APPENDIX I:

DATA COLLECTION SHEET ON ARTHROSCOPIC SURGERY OF THE KNEE

Hospital: _____

Case Number: _____

File Number: _____

Date Of Operation: _____

Date Of Discharge: _____

Sex/Age: (1) Male _____ [ ]
(2) Female _____ [ ]

Mechanism of Injury: (1) Sport Related _____ [ ]
(2) Road Traffic Accident _____ [ ]
(3) Assault _____ [ ]
(4) Fall (Outside Sport) _____ [ ]
(5) Spontaneous _____ [ ]
(6) Unspecified _____ [ ]

Clinical Presentation: (1) Pain Only _____ [ ]
(2) Knee Locking Only _____ [ ]
(3) Pain and Swelling/Effusion _____ [ ]
(4) Pain and Knee Locking _____ [ ]
(5) Pain and Swelling/Effusion and Knee Locking _____ [ ]

Clinical Diagnosis: (1) Meniscal Injury _____ [ ]

(2) Other _____ [ ]

Arthroscopic Findings: (1) Bucket Handle (Longitudinal) _____ [ ]

(2) Radial Type _____ [ ]

(3) Unspecified _____ [ ]

Arthroscopic Interventions: (1) Total Meniscectomy _____ [ ]

(2) Partial Menisectomy _____ [ ]

Tourniquet: (1) Yes _____ [ ]

(2) No _____ [ ]

If Yes, Duration:

1) < 30mins _____ [ ]
2) 30 – 59mins _____ [ ]
3) 60 – 119mins _____ [ ]
4) ≥ 120mins _____ [ ]

Foreign Bodies: (1) Present _____ [ ]

(2) Absent _____ [ ]

Closure: (1) Absorbable Suture _____ [ ]

(2) Non-absorbable Suture _____ [ ]

(3) Staples _____ [ ]

Loose Bodies: (1) Present _____ [ ]

(2) Absent _____ [ ]

Instruments: (1) Rigid _____ [ ]

(2) Flexible _____ [ ]

Irrigation Solution: (1) Normal Saline _____ [ ]

(2) Ringer's Lactate _____ [ ]

- Volume of Irrigation Solution: (1) 1litre _____ [ ]

(2) 2 litres _____ [ ]

(3) 3 litres _____ [ ]

(4) > 3 litres _____ [ ]

Debris: (1) Present _____ [ ]

(2) Absent _____ [ ]

Outcome at 3 Months Post-Surgery according to the Lysholm Knee Score:

(1) < 65 (Poor) _____ [ ]

(2) 65 – 83 (Fair) _____ [ ]

(3) 84 – 90 (Good) _____ [ ]

(4) > 90 (Excellent) _____ [ ]

Complications: (1) Excessive Haemorrhage _____ [ ]

(2) Significant Damage to Key Structures _____ [ ]

(3) Infection _____ [ ]

(4) No Significant Complications _____ [ ]

APPENDIX II:

Lysholm Knee Scale

Limp (5 Points)

None _____ 5
Slight or periodic _____ 3
Severe and constant _____ 0

Support (5 Points)

Full Support _____ 5
Cane or crutch _____ 2
Weight Bearing impossible _____ 0

Stair Climbing (10 points)

No problems _____ 10
Slightly impaired _____ 6
One step at a time _____ 2
Unable _____ 0

Squatting (5 Points)

No problem _____ 5
Slightly impaired _____ 4
Not past 90 degrees _____ 2
Unable _____ 0

Knee Locking (15 Points)

No locking and no catching
sensation _____ 15
Catching sensation minus
locking sensation _____ 10
Locks occasionally _____ 6
Locks frequently _____2
Currently locked _____ 0

Walking, Running and Jumping Instability (25 Points)

Never giving way _____ 25
Rarely gives way except
for athletic or other
severe exertion _____ 20
Gives way frequently
during athletic events
or severe exertion _____ 15
Occasionally in daily activities ____ 10
Often in daily activities _____ 5
Every step _____ 0

Swelling (10 Points)

None _____ 10
On severe exertion _____ 6

On ordinary exertion _____2
Constant _____0

Pain (25 Points)

None _____ 25
Inconstant and slight
during severe exertion _____ 20
Marked during severe exertion _____15
Marked on or after walking
more than 1 mile _____ 10
Marked on or after walking
less than 1 mile _____ 5
Constant and severe _____ 0

TOTAL _____/100

< 65 Poor 65-83 Fair 84-90 Good > 90 Excellent