A STUDY OF ARTHROSCOPIC MANAGEMENT OF MENISCAL INJURIES
G. Ramesh¹, J. Ashok Vardhan Reddy², Manne Vishnu Vardhan³

HOW TO CITE THIS ARTICLE:
G. Ramesh, J. Ashok Vardhan Reddy, Manne Vishnu Vardhan. “A Study of Arthroscopic Management of Meniscal Injuries”. Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 38, September 21, 2015; Page: 6058-6067, DOI: 10.18410/jebmh/2015/836

ABSTRACT: BACKGROUND: Meniscal injuries are common as a result of sports related injuries and motor vehicle accidents. Current arthroscopic partial meniscectomy/repairs indicated for management of meniscal tears because of early rehabilitation and return to work and minimal complications. MATERIALS AND METHODS: Present study is a hospital based prospective study of 20 adult cases admitted for a period of 14 months, age group involved was between 10-40 years with 17 patients were male and 3 patients were female. RESULTS: Meniscal injuries on Right Knee were 11 cases and Left Knee were 9 cases. Type of meniscal tear were longitudinal 10 cases, oblique 5 cases, horizontal 3 cases, radial 1 case and complex (with discoid meniscus) tear 1 case. Meniscal injuries associated with partial/complete ACL tear were 6 cases. There was one case of discoid meniscus. Surgery was performed at an average 1 month after Meniscal tear, duration of hospital stay was 3.6 days ranging from 3-6 days, mean time for earliest return to work was 14.35 days with range 10-16 days. Excellent to good results were seen in 95 % of cases. CONCLUSION: Arthroscopic meniscectomy is minimally invasive technique. Advantage of which includes early return to work, minimal complications, early post-operative rehabilitation, short duration of hospital stay. KEYWORDS: Meniscal injuries, Arthroscopic meniscectomy, Complications.

INTRODUCTION: Meniscal function is essential to the normal function of the knee joint. The menisci act as joint filler, compensating for gross incongruity between femoral and tibial articulating surfaces. So located, the menisci prevent capsular and synovial impingement during flexion-extension movements. The menisci are believed to have a joint lubrication function, helping to distribute synovial fluid throughout the joint and aiding the nutrition of the articular cartilage. They undoubtedly contribute to stability in all planes but are especially important rotary stabilizers and are probably essential for the smooth transmission from a pure hinge to a gliding or rotary motion as the knee moves from flexion to extension.

Traumatic lesions of the menisci are produced most commonly by rotation as the flexed knee moves toward an extended position. The medial meniscus, being far less mobile on the tibia, can become impaled between the condyles, and injury can result. The most common location for injury is the posterior horn of the meniscus, and longitudinal tears are the most common type of injury. The length, depth, and position of the tear depend on the position of the posterior horn in relation to the femoral and tibial condyles at the time of injury.

Meniscal injuries are being on a rise due to increased sporting activities, leading to disabilities in sporting & other activities. Treatment of such injuries is gaining importance &
arthroscopy has the advantage of minimal invasive surgery in preventing extensive damage to the much complicated anatomy of the knee. Hence it is worth to have a study of this subject.

**MATERIALS AND METHODS:** This study includes 20 cases of meniscal injuries of knee treated by arthroscopic partial meniscectomy or repair at Department of orthopedics. This is prospective time bound study conducted during the period from January 2013 to March 2014. Sample size consists of 20 patients. Follow up has been done up to 6 months

**Inclusion Criteria:** Patients aged between 10-40 years, clinically suspected meniscal injuries

**Exclusion Criteria:** Patients with infective condition in and around the knee joint, Meniscal injuries with tibial plateau fractures and distal femoral fractures.

Patients with clinically suspected meniscal injury were admitted, thoroughly examined clinically and confirmed with MRI knee, routine investigations were done and documented. These cases were posted for diagnostic and therapeutic arthroscopy. Anaesthesia - All patients were administered spinal anaesthesia. Tourniquet - Esmarch or pneumatic tourniquet was used.

**Surgical Technique:**

After anaesthesia, Esmarch’s tourniquet was applied. The affected knee was prepared with betadine scrub, lower limb painted with betadine, and draped. Entry portals were made 1cm above the joint line and 1cm lateral to the lateral margin of patellar tendon. Most common combination used was anterolateral portal for arthroscopy and anteromedial portal for the instrumentation.

Initially we distended the joint with irrigation solution (normal saline) by placing an inflow cannula through the superior antero- lateral portal and then inserted the arthroscope through inferior antero-lateral portal. Joint distention is maintained by hydrostatic pressure, 3 liter bags of normal saline solution are hung approximately 1 meter above the level of the knee to provide continuous inflow, a suction out flow system is connected to arthroscope sheath. The negative active pressure in this system must be adjusted maintaining maximum volume in the knee.

When the effluent is clear, the 30° scope was locked in to the sheath. Camera and light source were connected to the scope and knee joint was visualized methodically.

A fixed routine guideline was followed and knee joint examined in following compartment.

1. Supra patellar pouch and patello femoral joint.
2. Medial compartment
3. Lateral compartment
4. Intercondylar notch
5. Posteromedial compartment.

Examination of the knee begins in the supra patellar pouch. Then the scope is swept down across the medial compartment. Meniscus is examined for tear using the probe. Probe was passed through antero–medial portal and by withdrawing the scope a few millimeter, the intercondylar notch comes into view and ACL and part of PCL could be seen with synovium and ligamentum mucosum covering it. By keeping the scope in that position ACL was palpated with the probe and looked for any laxity or tear.
The scope was slightly withdrawn, the leg was kept in figure of four position for opening the lateral joint space. In this position the lateral meniscus comes in to view which was also probed. Then the knee is extended and scope is run along the lateral gutter in to supra patellar pouch to complete the examination. Then depending on the type of meniscal lesion appropriate technique was chosen and excision/repair were performed in same sitting.

**Figure 1:** Principles of partial meniscectomy. Shaded areas show the different types of meniscal tears: vertical longitudinal (A), oblique (B), radial (C), and horizontal (D). The surgeon must remove the tear and leave as much normal meniscus as possible. The meniscus is also contoured for a smooth edge.

**Figure 2:** Principles of meniscectomy for bucket handle tear. The displaced fragment is reduced into its normal position with a probe. The posterior attachment is nearly transected under direct vision using a meniscal biter. The anterior attachment is transected using meniscal biters or knife. The fragment is grasped in line with the bulk of the meniscus, avulsed (rotating the meniscus may help) from its remaining posterior attachment, and removed.
Post-Operative Care:

1. Jones type padded cotton dressing was applied from mid-thigh to ankle for 24-48 hours to give better compression and haemostasis.
2. During preoperative period isometric quadriceps exercises are taught to the patients and are begun as soon as the patients recover from anaesthesia.
3. Patients were allowed to bear full weight on second postoperative day onwards.
4. Early active range of motion was also started on second day onwards.

Functional outcome was assessed based on Lysholm score and Tapper and Hoover grade. Based on patients complaints and physical examination finding were calculated according to Lysholm knee scoring system and graded according to Tapper and Hoover system.

|   | Limp (5 points)                      |
|---|-------------------------------------|
| 1 | None                                |
|   | Slight or Periodical                |
|   | Severe or constant                  |
| 2 | Support (5 points)                  |
|   | None                                |
|   | Stick or crutch                     |
|   | Weight bearing impossible           |
| 3 | Locking (15 points)                 |
|   | No locking and no catching sensation|
|   | Catching sensation but no locking   |
|   | Locking occasionally                |
|   | Locking frequently                  |
|   | Locked joint on examination         |
| 4 | Instability (25 points)             |
|   | Never giving way                    |
|   | Rarely during athletics or other severe exertion |
|   | Occasionally in daily activities    |
|   | Often in daily activities           |
|   | Every Step                          |
| 5 | Pain (25 points)                    |
|   | None                                |
|   | Inconsistent and slight during severe exertion |
|   | Marked during severe exertion       |
|   | Marked on or after walking more than 2 km |
|   | Marked on or after walking less than 2 km |
|   | Constant                            |
6. **Swelling (10 points)**

| Description                  | Points |
|------------------------------|--------|
| None                         | 10     |
| On Severe exertion           | 6      |
| On ordinary exertion         | 2      |
| Constant                     | 0      |

7. **Stair climbing (10 points)**

| Description                  | Points |
|------------------------------|--------|
| No Problem                   | 10     |
| Slight impaired              | 6      |
| One step at a time           | 2      |
| Impossible                   | 0      |

8. **Squatting (5 points)**

| Description                  | Points |
|------------------------------|--------|
| No problem                   | 5      |
| Slight impaired              | 4      |
| Not beyond 90 degrees        | 2      |
| Impossible                   | 0      |

**Table 1: Lysholm Knee Scoring**

**Excellent**

The patient had no symptom's and no disability related to his knee

**Good**

The patient had minimum symptom, such as aching or weakness after heavy use/exertion but there was essentially no disability

**Fair**

The patient had a symptom, which had become enough of a problem to interfere somewhat with daily activities and though active, could not participate in vigorous sports

**Poor**

The symptoms were severe and included pain at rest, limited motion and locking. He was disabled, and all activities including walking were definitely limited because of his knee

**Table 2: Tapper and Hoover System**

**RESULTS:** The study consists of 20 cases of meniscal injuries with or without ACL tear, treated surgically by partial meniscectomy or repair.

The age ranges from 10-40 years with mean age of 27.05 years in our series of meniscal injuries. Maximum incidence of meniscal injuries was found between 20-30 years age groups. Most of the patients had motor vehicle accidents and others were sports persons and manual workers.

**Table 3: Age and Sex Distribution**
17 patients were male (85%), 3 patients were female (15%) in our series of meniscal injuries. Meniscal injuries are more common in males which may be reflection of male being more involved in aggressive sporting and manual activities that predispose to rotational injuries of the knee.

| Side Involved | Male | Female | Total |
|---------------|------|--------|-------|
| Rt Knee       | 8    | 3      | 11    |
| Lt Knee       | 9    | 0      | 9     |
| **Total**     | 17   | 3      | 20    |

Table 4: Side involvement

Out of 20 cases in our series of Meniscal injuries the (Rt) knee was involved in 11 cases (55%) and (Lt) knee was involved in 9 cases (45%)

| Type of injury               | No. of cases | Percentage |
|------------------------------|--------------|------------|
| Motor Vehicle accident       | 13           | 65%        |
| Sports related injuries      | 2            | 10%        |
| Other Injuries               | 5            | 25%        |

Table 5: Mode of injury

13 patients (65 %) had Meniscal injuries due to motor vehicle accident and 2 patients (10%) due to sports related injuries, 5 patients (25 %) due to other causes.

| Meniscal tears | Isolated Meniscal tear | Associated with ACL/PCL injury | Associated with discoid meniscus | Total |
|----------------|------------------------|-------------------------------|---------------------------------|-------|
| Medial Meniscus| 7                      | 5                             | 0                               | 12    |
| Lateral Meniscus| 6                      | 1                             | 1                               | 8     |
| **Total**      | 13                     | 6                             | 1                               | 20    |

Table 6: Meniscal injuries associated with A. C. L./ P.C.L. tear

13 isolated Meniscal injuries found in our series of study and 6 meniscal injuries associated with ACL/ PCL tear, one meniscal injury associated with discoid meniscus in lateral meniscus.
Figure 3: Types of Meniscal injuries.

Out of 20 cases in our series of meniscal injuries were 10 cases of longitudinal tear (50%), 5 cases of oblique tear (25%), 3 cases of horizontal tear (15%), 1 case of radial tear and one case of discoid meniscus with tear (5%).

Functional outcome was assessed based on Lysholm score and Tapper and Hoover grade.\(^4\) Based on patient’s complaints and physical examination finding were calculated according to Lysholm knee scoring system and graded according to Tapper and Hoover system.

| Score   | Group  |
|---------|--------|
| 81-100  | Excellent |
| 71-80   | Good    |
| 61-70   | Fair    |
| < 60    | Poor    |

Table 7: Scoring according to Tapper and Hoover System

Figure 4: Percentage score according to Tapper and Hoover System.
**Post-Operative Complication:** No complication such as haemarthrosis, infection, deep vein thrombosis, joint effusion was encountered.

**Time of Discharge:** Patients were discharged at an average of 3.4 days with range from 3 to 6 days

**Follow up Period:** Patients were followed up in the out-patient department at 1st week, 2nd week & 4th week. After that every month for 6 months.

**DISCUSSION:** Treatment of Meniscal injuries has evolved from conservative management, open menisectomy to partial arthroscopic meniscectomy. Simpson D A et al,\(^5\) reviewed comparative analysis of open and arthroscopic meniscectomy results and confirmed the overall economical and therapeutic advantage of arthroscopic partial meniscectomy over open meniscectomy. Other authors have reported short hospital stay and early return to work and sports (Lysholm and Gillquist\(^5\) 1981; Northmore Ball and Dandy D.J\(^7\) 1982; Good Fellow J.W 1983).

Majority of our patients were males in range of 20-30 years which may be reflection of male being more involved aggressively in sporting and manual activities which are common to cause meniscal injuries. In series of David A Simpson et al\(^6\) the mean age of the 230 patients was 30.7 years (range 7 to 67 years) nearly half of them were in third decade men and boys, formed 90% of the series.

In our series 65% of cases were motor vehicle accidents with twisting injuries, 10 % included sports related injuries and other injuries were 25%. Thus motor vehicle accident and sports related injuries are the common causes of Meniscal injuries. Where as in study of Tapper E. M et al\(^8\), all injuries involved a rotational component with or without direct blow to knee, Injuries occurs in cases of athletes, manual laborers, bad fall etc. Incidence of type of Meniscal tear in our study was 13 cases isolated Meniscal tear, 6 cases associated tear of ACL/PCL, and 1 case was associated with discoid meniscus.

| Name of series           | No. of Patients | Excellent & good result | Fair & Poor results |
|--------------------------|-----------------|-------------------------|---------------------|
| Simpson D.A et al 1986\(^5\) | 72              | 80.56%                  | 10.44%              |
| Rao S.K Rao P.S 1997\(^3\) | 50              | 90%                     | 10%                 |
| Umar M 1997\(^9\)        | 139             | 93%                     | 7%                  |
| Schimmer R.C et all 1998\(^10\) | 119         | 94.8%                   | 5.2%                |
| Our Study                | 20              | 95%                     | 5%                  |

Table 8: Functional Outcome Results Compared With Other Studies

In our study, longitudinal (Bucket handle) tear 10 cases (50%), oblique tear 5 cases (25%), horizontal tear 3 cases (15%), radial tear one case (5%), complex tear (Discoid meniscus) one case (5%) were found.

Where as in series of Rao P. S. Rao: S.K Bhat S.N\(^11\) longitudinal (Bucket handle) tear 63.72%, Radial tear 7.87%, degenerative tear 7%, other type 21.15% were found.

In series of D. J Dandy\(^12\) vertical (Longitudinal) tear was common than the other type of Meniscal tear.
Mean operative time in our series was 70 minutes as compared to 45 minute by Tregonning RJA.\textsuperscript{13} Mean duration of hospital stay in our study of arthroscopic meniscectomy was average of 3.6 days compared to 2.4 days (Range 1 to 7 days) as reported by Simpson. D. A,\textsuperscript{4} 1 day as reported by Tregonning. RJA,\textsuperscript{13} 1 to 7 days as reported by Jan Gillquistand Oretops N.\textsuperscript{4}

Functional outcome results in our series excellent 70%, good 25%, Fair 5% as compared results in series of Rao S.K Rao P.S\textsuperscript{11} was excellent 80%,good 10 % and Poor – 10 %. In series of Umar. M,\textsuperscript{9} isolated Meniscal injuries were 93 % Excellent 7 % Fair result by criteria of Tapper and Hoover, 75% had excellent to good result and 25% had fair results in meniscal injuries associated ACL deficiency.

Functional results in series of Simpson DA, Thomas N. P\textsuperscript{5} was excellent too good in 80.55% of cases and fair to Poor in 19.44 % cases. Where as in series of Schimmer R.C et al\textsuperscript{10} 94.8% of patients had an excellent to good results and 5.2% Fair to Poor results.

Majority of our patients returned to their pre meniscal injury activity in 14.35 days where as in series of RJA\textsuperscript{13} Tregoning mean time for return to work was 12.9 days and in series of Dandy D.J\textsuperscript{12} 10.5 days.

During intra operative period we had no incidence of breakage of instrument in knee joint. No incidence of infection, deep vein thrombosis (DVT). Incidence of instrument breakage was 0% in our series. 3.7% of intra operative incidence of instrument breakage in series of Whipple T. Let al.\textsuperscript{15}In series of Tregoning R.J.A\textsuperscript{13} in one patient instrument breakage was reported.

Thus arthroscopic partial meniscectomy has many advantages in the treatment of meniscal injuries. Arthroscopic meniscectomy reduces hospital stay, gives early relief of symptoms, low morbidity and patients return to their work early and minimal complications.

Hence arthroscopic partial meniscectomy is preferred treatment of choice for management of Meniscal injuries.

CONCLUSION: Incidence of Meniscal injuries is most common due to motor vehicle accident and other causes being sports related injuries and fall by slip. Arthroscopic meniscectomy is minimally invasive technique. Advantage of which includes early return to work, minimal complications, early post-operative rehabilitation, Short duration of hospital stay. Hence this is the preferred technique for treatment of Meniscal injuries. But it is a technically difficult procedure with steep learning curve.

REFERENCES:
1. Textbook “Campbell’s Operative Orthopedics topic 43 Knee Injuries Robert H.Miller III” – Page no 2182-2185.
2. John.M. Ginty .Textbook of operative arthroscopy second edition;1-597.
3. Rao S. K, Rao P.S “Lysholm” Scoring system to evaluate Meniscal injury Indian Journal of orthopedics 1997 Vol. 31 (2) 107-109.
4. Gillquist J, Oretorp. N “Arthroscopic partial meniscectomy technique and long term results” Clinical orthopedics and related Research 1982, 167: 29-33.
5. Simpson D.A Thomas N.P; Aichroth P.M open and closed meniscectomy – A comparative analysis J: Bone and Joint Surgery 1986; 68-B 301-304.
6. Lysholm J, Gillquist J. "Endoscopic meniscectomy" Int Ortho P 1981: 5(4): 265-270.
7. North More –Ball Dandy D. J. “Arthroscopic open partial and total meniscectomy” J Bone Joint Surg (Br) 1983: 65(B): 400-404.
8. Tapper E.M Hoover N. W, Rochester; Minnestoa “Late results after meniscectomy” J:Bone and Joint Surgery, April 1969 Vol. 51-A No3 517-526.
9. Umar M “Ambulatory arthroscopic knee surgery results of partial meniscectomy” J. Pak Med Assoc. 1997 Aug 47 (8) 210-213.
10. Schimmer R. C, Bruhlart K.B, Duff C, Glinz W “Arthroscopic partial meniscectomy a 12 year follow up and two step evaluation of the long term course” Arthroscopy 1998 Mar: 14(2) 136-142.
11. Rao. P. S Rao S. K, Bhat N.S "Short and long term results of arthroscopic partial meniscectomy“ Indian Journal of orthopedics 2004, 38 (3) 158-161.
12. Dandy D.J “The arthroscopic anatomy of symptomatic Meniscal lesions” J Bone and Joint Surgery, July 1990 72-B: 628- 633.
13. Tregoning R. A. J; "Closed partial meniscectomy early results for simple tears with mechanical systems” J: Bone and Joint Surgery 1983: 65: 378-381.
14. Gillquist J, Oretorp. N “Arthroscopic partial meniscectomy technique and long term results” Clinical orthopedics and related Research 1982, 167: 29-33.
15. Whipple T.L, Caspari. R. B. Meyers J.F “Arthroscopic meniscectomy an interim repeat at three to four years after operation” Clinical orthopedics and related Research. 1984; 183; 105-113.

AUTHORS:
1. G. Ramesh
2. J. Ashok Vardhan Reddy
3. Manne Vishnu Vardhan

PARTICULARS OF CONTRIBUTORS:
1. Associate Professor, Department of Orthopedics, Gandhi Medical College, Secunderabad.
2. Associate Professor, Department of Orthopaedics, Mallareddy Institute of Medical Sciences, Suraram, R. R. District.
3. Senior Resident, Department of Orthopedics, Gandhi Medical College, Secunderabad.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:
Dr. G. Ramesh,
Associate Professor,
Department of Orthopedics,
Gandhi Medical College,
Secunderabad.
E-mail: drrameshgaripalli@yahoo.co.in

Date of Submission: 04/09/2015.
Date of Peer Review: 05/09/2015.
Date of Acceptance: 09/09/2015.
Date of Publishing: 19/09/2015.