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Short-term functional outcomes of symptomatic discoid lateral meniscus after arthroscopic partial meniscectomy and saucerization

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Abstract: *A discoid meniscus is a congenital dysplastic meniscus in which atypical development of the meniscus lead to a broad disc like configuration. The lateral discoid meniscus is more common than the medial. It is larger, wider and thicker than the normal fibro-cartilaginous meniscus of the knee and covers the tibial plateau more than the normal one. The aim is to investigate the short-term clinical functional outcomes of arthroscopic partial meniscectomy and saucerization for the treatment of symptomatic discoid lateral meniscus. An interventional study on 10 patients who underwent arthroscopic partial menisectomy and saucerization for symptomatic discoid lateral meniscus. The patient's age was ranging from 9 - 52 years with a mean±SD of 33.6± 11.11 years, and the mean follow-up period was 12 months. The mean of Lysholm Knee Scoring Scale was significantly increased after three and after nine months compared to the scale before management (61.9% versus 80.4%, P= 0.001; and 61.9% versus 93.1%, P=0.001, respectively). Arthroscopic partial menisectomy & saucerization for symptomatic discoid lateral meniscus led to satisfactory clinical outcomes after short term follow up 12 months. The (age, sex, occupation, and type of DLM according to Watanabe classification) have no effect on the result of operation which mean the orthopedics handling and surgical facility determine the outcome of treatment.*

Key words: *Discoid Meniscus, Arthroscopic Saucerization, Partial Meniscectomy, Iraq*

I. INTRODUCTION

A discoid meniscus is a congenital dysplastic meniscus, and the lateral is more common than medial. It is larger, wider and thicker than the normal fibro-cartilaginous meniscus of the knee and cover the tibial plateau more than the normal one [1, 2, 3]. The prevalence of discoid meniscus varies between 0.4% and 17% [2, 4]. Conservative treatment, which include life style modification and physiotherapy, is adequate for non-symptomatic and incidentally found discoid lateral meniscus. An intermittent follow-up for the exclusion of symptoms and a physical examination permits early detection of any deterioration and helps in planning appropriate treatment [5]. Surgery is required in case of symptomatic torn discoid meniscus causing pain and locking the movement of the knee joint [5]. The surgical methods for discoid lateral meniscus tear include open or arthroscopic procedures, which can be subdivided into total meniscectomy, partial meniscectomy and saucerization with or without suture

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repair of a meniscal tear. The traditional treatment for discoid meniscus is open total meniscectomy, in which almost whole meniscus is resected. This procedure frequently leads to the early development of cartilage degeneration and other complications [6]. These procedures for symptomatic discoid meniscus has achieved excellent outcomes [7] and permitted more accurate diagnosis and better treatment of the lesion [8]. Therefore, arthroscopic partial meniscectomy and saucerization have been advised for the better outcome [9-13]. In Europe, an incidence between 1.2 and 5.2% [14, 15]. In East-Asian countries, such as Japan (16), Korea (17), and China (18), it is seen more frequently, with an incidence between 13 and 46%. In 20–90% of cases, a discoid meniscus is bilaterally [19]. Bellier et al [20] found only an incidence of 20%, whereas Fujikawa et al. [21] reported an incidence of 90%. This wide range may be partly explained by ethnicity, cultural habits, and participation in sport activities. Irani et al [22] and Mitsuoka et al [23] found that 15% of patients with osteochondritis dissecans of the knee also presented with a discoid meniscus.

II. METHODS

All cases who are candidate for arthroscopy were reviewed for their sociodemographic data such as age and sex. Detailed history was taken that covering the chief complaint, time and type of injury if present, onset of effusion if present, presence of locking, giving way and subjective instability. The clinical tests that used for confirmation the diagnosis of lateral meniscal injury were Thessaly's test / McMurray's test. Then the patients with positive findings referred for plain x-ray and MRI scanning with some example of findings as showed in (Fig.1 and 2). All patients were operated on by the same surgeon, patients were in the supine position under general or spinal anesthesia with a calibrated pneumatic tourniquet placed at the root of the thigh, elevation of the limb and Esmarch bandage apply in a distal-to-proximal direction for exsanguination, the tourniquet time was <60 min(Fig.3). The arthroscope was introduced by anterolateral and anteromedial portal, Arthroscopic examination was performed to check the intra-articular structures: suprapatellar pouch, patellofemoral joint, medial gutter, medial compartment, intercondylar notch, lateral compartment and lateral gutter. The meniscus was probed carefully to identify individual structures, type of the discoid lateral meniscus, stability of the peripheral rim, position and extent of the meniscus tear if present, as well as other accompanying lesions (Figs.4). The type of discoid meniscus was classified according to Watanabe et al [17], five of our cases were type I (complete), four were type II (incomplete) and one were type III (hypermobile Wrisberg). The meniscal tear if present was carefully resected using standard techniques and the meniscal rim was preserved. The methods in common use are partial resection and saucerization (shaping of the DLM), following the partial meniscectomy, the resected edge was smoothened, the meniscus was reshaped (saucerization), the peripheral rim was then thickened and the free edge of the meniscus was thinned by shaver to form a slope (Figs. 5a and b). Following surgery, the joint was lavaged carefully to remove all the debris, the arthroscopic portals were sutured and dressing apply with compression bandage. The postoperative care was immediate weight-bearing with early mobilization. Ten patients were followed up for a 12 months. The Lysholm scoring system was used to assess the function of the knee prior to surgery and during the follow-up period 3 and 9 months postoperative. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Paired t-test (two tailed) was

used to compare different scores pre and postoperatively among study groups. A level of P – value less than 0.05 was considered significant.

Figure 1: Radiographs with the widening of the lateral joint space and cupping of the lateral tibial plateau

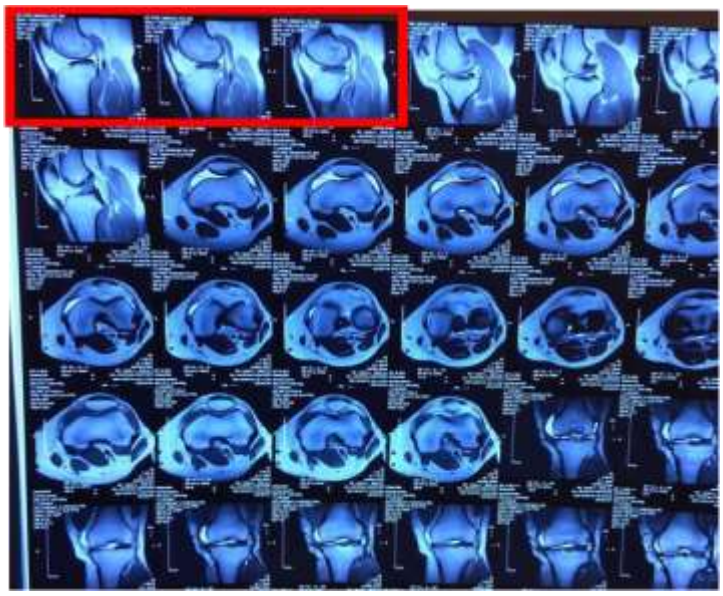

Figure 2: discoid lateral meniscus , MR images with bowtie appearance on three consecutive images

Figure 3: Intraoperative preparation for arthroscopy

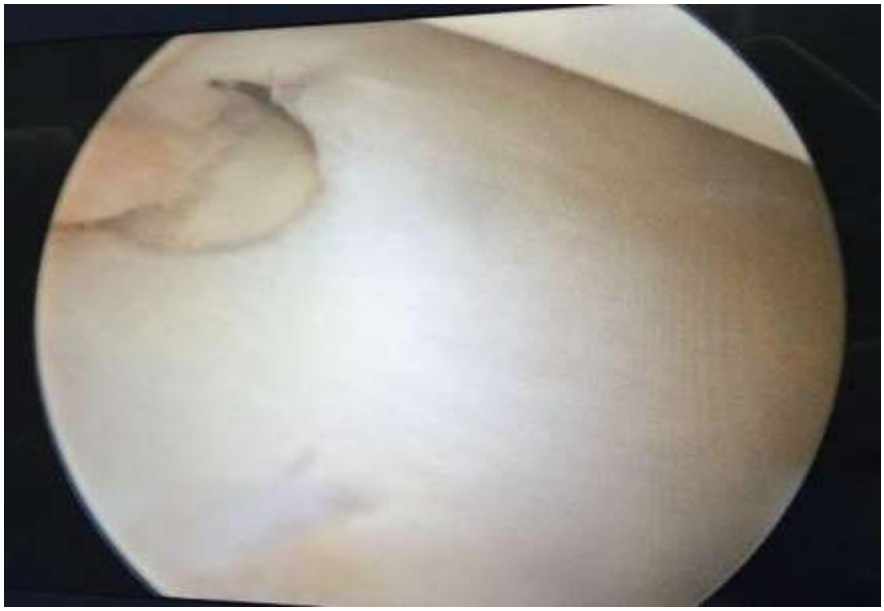

Figure 4: arthroscopic view of discoid lateral meniscus

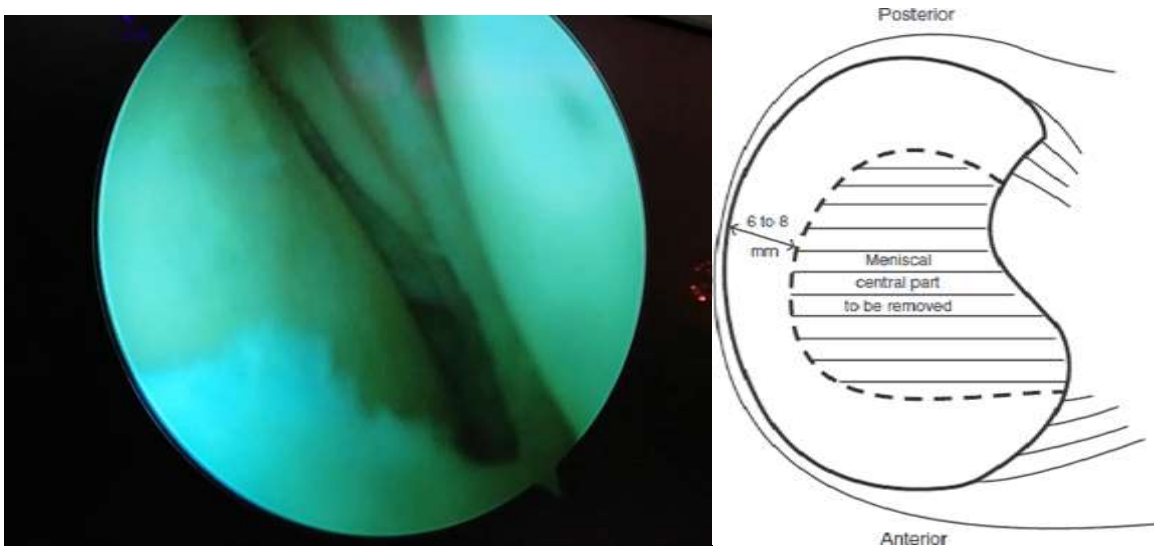

Figure 5 a and b: arthroscopic view of discoid lateral meniscus after partial menisectomy and saucerization. This drawing shows the circular curve to follow

III. RESULTS

All of them were presented with symptomatic lateral discoid meniscus and treated by partial menisectomy and saucerization. The distribution of study patients by general characteristics is shown in table 1. Study patient's age was ranging from 9-52 years with a mean of 33.6±11.11 years. Regarding gender, proportion of males was higher than females (70% versus 30%) with a male to female ratio of 2.33:1. Concerning occupation, Half of study patients were workers (50%). The distribution of study patients by chief complaint is shown in figure 6. Figure7 show the distribution of study patients by Watanabe classification. Complete classification was presented in half of study patients (50%). The distribution of study patients by imaging study is shown in figure8. Normal x-ray was found in 40% of study patients, also joint space widening was seen in other 40% of them. The means of limp score pre and three and nine months postoperatively is shown in figure 9 and table 2. In this study, means of limp score after 3 and 9 months of operation were significantly higher than that before operation (4.6 versus 3.3, P= 0.006; and 5.0 versus 3.30, P= 0.006, respectively). The means of using cane or crutches score pre and three and nine months postoperatively is shown in figure10 and table 3. In this study, there were no significant differences in means of using cane or crutches score after 3 and 9 months of operation. The means of locking sensation in the knee score pre and three and nine months postoperatively is shown in figure11 and table 4. In this study, means of locking sensation in the knee score after 3 and 9 months of operation were significantly higher (7.4 versus 12.6, P= 0.001; and 7.4 versus 14.5, P= 0.001, respectively). The means of giving way sensation from the knee score pre and three and nine months postoperatively is shown in figure12 and table 5. In this study, there were no significant differences ($P \geq 0.05$) in means of giving way sensation from the knee score. The means of pain score pre and three and nine months postoperatively is shown in figure13 and table 6. In this study, means of pain score after 3 and 9 months of operation were significantly higher (16.5 versus 20.5, P= 0.003; and 16.5 versus 24, P= 0.001, respectively). The means of swelling score pre and three and nine months postoperatively is shown in figure14 and table 7. In this study, means of swelling score after nine months of operation were significantly higher (5.2 versus 9.6, P= 0.001). While after three months of operation, there was no significant difference in swelling score

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compared to that preoperatively (P= 0.052). The means of climbing stairs score pre and three and nine months postoperatively is shown in figure15 and table 8. In this study, means of climbing stairs score after nine months of operation were significantly higher (6.4 versus 10, P= 0.001). While after three months of operation, there was no significant difference in climbing stairs score compared to that preoperatively (P= 0.168). The means of squatting score pre and three and nine months postoperatively is shown in figure16 and table 9. In this study, means of squatting score after 3 and 9 months of operation were significantly higher (0.8 versus 3.4, P= 0.001; and 0.8 versus 4.5, P= 0.001 respectively). The means of total Lysholm Knee Scoring Scale before and after three and nine months of management is shown in figure17 and table 10. It was obvious that the mean of Lysholm Knee Scoring Scale was significantly increased after three and after nine months compared to the scale before management (61.9% versus 80.4%, P= 0.001; and 61.9% versus 93.1%, P=0.001, respectively). Regarding means of Lysholm Knee Scoring Scale after three and nine months after management, it was significantly increased after nine months of operation compared to the scale after three months of operation (80.4% versus 93.1%, P= 0.001). The total means of Lysholm Knee Scoring Scale pre and three months postoperatively is shown in table 11. In this study, means of Lysholm Knee Scoring Scale by all characteristics of study patients were significantly increased (P < 0.05) after three months of operation than that preoperatively. The total means of Lysholm Knee Scoring Scale pre and nine months postoperatively is shown in table 12. In this study, means of Lysholm Knee Scoring Scale by all characteristics of study patients were significantly increased (P < 0.05) after nine months of operation than that preoperatively.

Table 1: Distribution of study patients by general characteristics

Variable	No. (n=10)	(%)
Age (Years)		
< 30	3	30.0
≥ 30	7	70.0
Gender		
Male	7	70.0
Female	3	30.0
Occupation		
Housewife	3	30.0
Military	2	20.0
Worker	5	50.0

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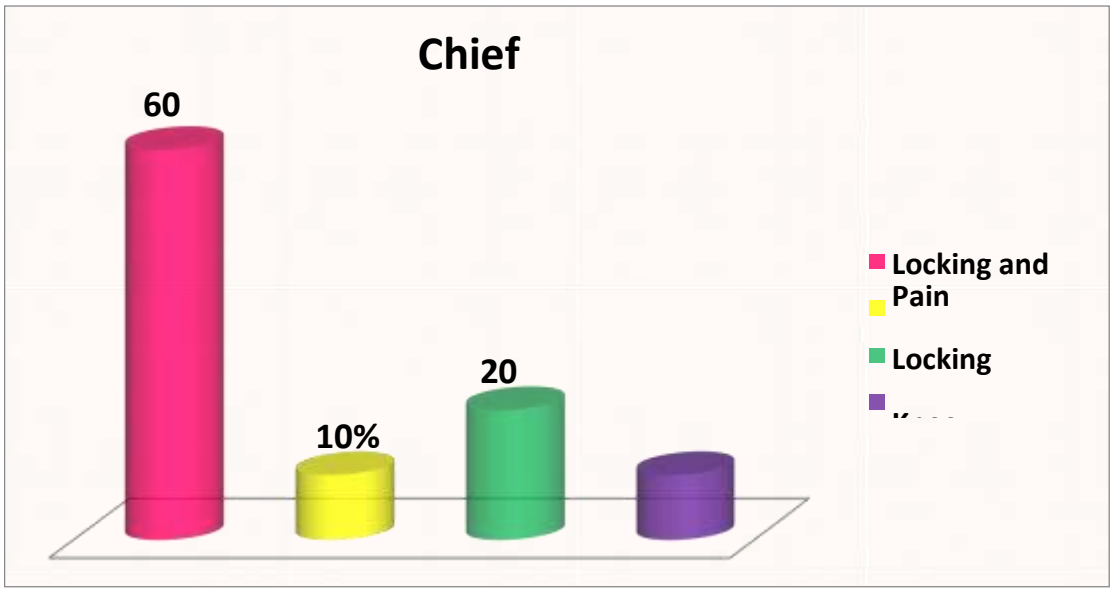

Figure 6: Distribution of study patients by chief complaint

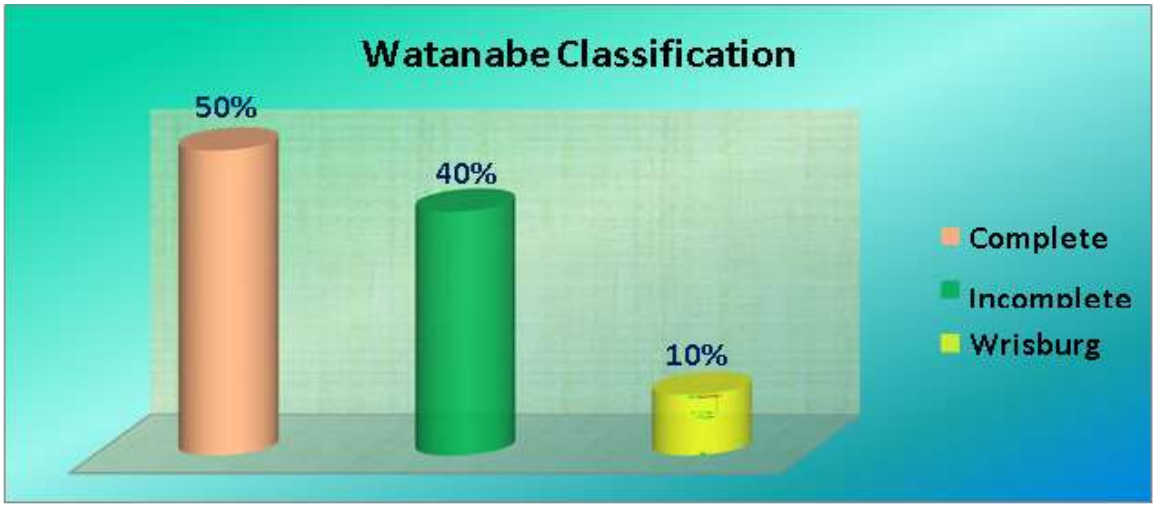

Figure 7: Distribution of study patients by Watanabe classification

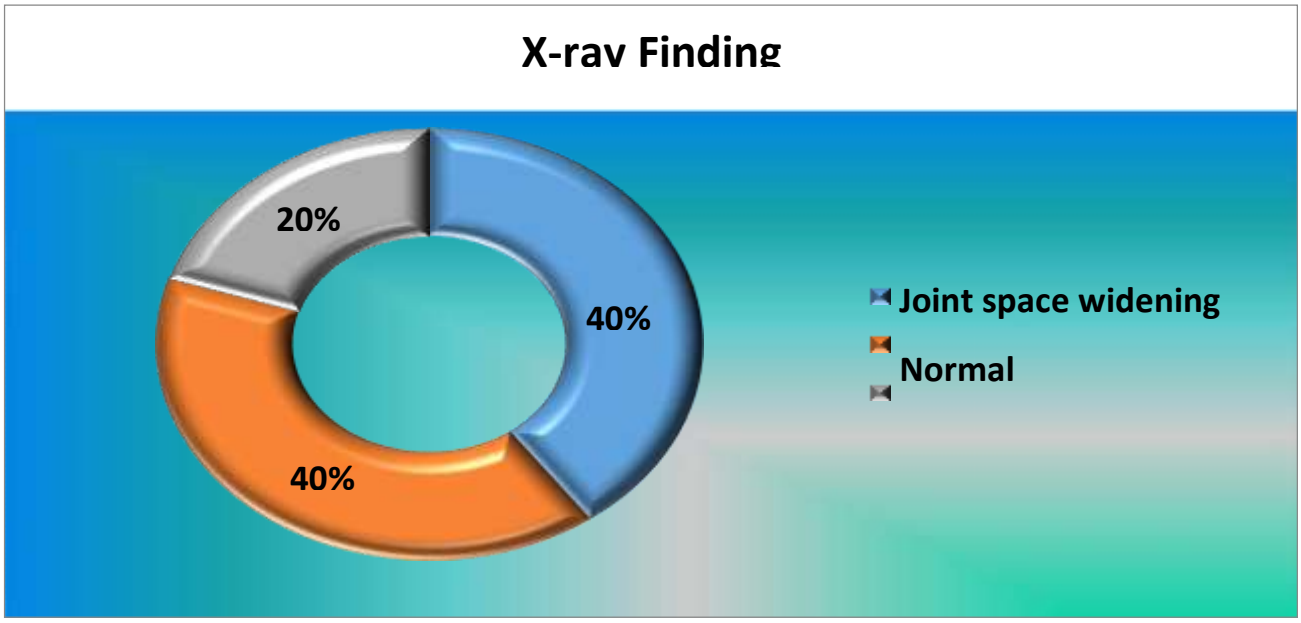

Figure 8: Distribution of study patients by imaging study

Table 2: Comparison in mean of limp score pre and three and nine months postoperatively

Variable	Limp Score Mean ± SD	P - Value
Preoperatively	3.3 ± 1.49	0.006
3 Months Postoperatively	4.6 ± 0.84	
9 Months Postoperatively	5.0 ± 0	

Table 3: The using cane or crutches score pre and three and nine months postoperatively

Variable	Cane or Crutches Score Mean ± SD	P-Value
Preoperatively	4.7 ± 0.94	0.343
3 Months Postoperatively	5.0 ± 0	
9 Months Postoperatively	5.0 ± 0	

Table 4: The locking sensation in the knee score before and after 3 months, 9 months of operation

Variable	Locking Sensation In The Knee Score Mean ±SD	P-Value
Preoperatively	7.4 ± 4.19	0.001
3 Months Postoperatively	12.6 ± 3.3	

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9 Months Postoperatively	14.5 ± 1.58	

Table 5: The giving way sensation from the knee score pre and three and nine months postoperatively

Variable	Giving Way Sensation From The Knee Score Mean ± SD	P-Value
Preoperatively	19.5 ± 2.83	0.343
3 Months Postoperatively	20.5 ± 1.58	
Preoperatively	19.5 ± 2.83	0.104
9 Months Postoperatively	21.5 ± 2.41	

Table 6: The pain score pre and three and nine months postoperatively

Variable	Pain Score Mean ± SD	P-Value
Preoperatively	16.5 ± 3.37	0.003
3 Months Postoperatively	20.5 ± 1.58	
Preoperatively	16.5 ± 3.37	0.001
9 Months Postoperatively	24.0 ± 2.1	

Table 7: Difference in means of swelling before and after 3 months, 9 months of operation

Variable	Swelling Score Mean ± SD	P-Value
Preoperatively	5.2 ± 1.68	0.052
3 Months Postoperatively	7.2 ± 1.93	
Preoperatively	5.2 ± 1.68	0.001
9 Months Postoperatively	9.6 ± 1.26	

Table 8: The climbing stairs score pre and three and nine months postoperatively

Variable	Climbing Stairs Score Mean ± SD	P-Value
Preoperatively	6.4 ± 1.26	0.168
3 Months Postoperatively	7.2 ± 1.93	
Preoperatively	6.4 ± 1.26	0.001
9 Months Postoperatively	10.0 ± 0	

Table 9: Comparison in mean of squatting score pre and three and nine months postoperatively

Variable	Squatting Score Mean ± SD	P-Value
Preoperatively	0.8 ± 0.42	0.001
3 Months Postoperatively	3.4 ± 1.26	
9 Months Postoperatively	4.5 ± 0.52	

Table 10: The total Lysholm Knee Scoring Scale before and after three and nine months of management

Variable	Total Lysholm Knee Scoring Scale Mean ± SD	P-Value
Preoperatively	61.9 ± 8.42	0.001
3 Months Postoperatively	80.4 ± 5.69	
9 Months Postoperatively	93.1 ± 4.12	

Table 11: The total means of Lysholm Knee Scoring Scale pre and after 3 months of operation

Variable	Total Lysholm Knee Scoring Scale		P- Value
	Pre Operation Mean ± SD	Three months postoperatively Mean ± SD	
Age (Years)			
< 30	55.0 ± 6.24	84.66 ± 4.5	0.04
≥ 30	64.85 ± 7.71	78.57 ± 5.38	0.002
Gender			
Male	65.71 ± 6.55	79.14 ± 5.27	0.002
Female	53.0 ± 4.58	83.33 ± 6.65	0.033
Occupation			
Housewife	53.0 ± 4.58	83.33 ± 6.65	0.033
Military	53.0 ± 4.58	83.33 ± 6.65	0.033
employee	64.2 ± 5.73	78.6 ± 3.91	0.007
Watanabe Classification			
Complete	60.0 ± 11.11	81.2 ± 5.71	0.032
Incomplete	64.25 ± 5.9	82.25 ± 2.21	0.003

Table 12: The total means of Lysholm Knee Scoring Scale pre and after 9 months of operation

Variable	Total		P- Value
	Preoperatively Mean ± SD	Nine Months Postoperatively Mean ± SD	

Age (Years)			
< 30	55.0 ± 6.24	96.33 ± 2.3	0.007
≥ 30	64.85 ± 7.71	91.71 ± 4.02	0.001
Gender			
Male	65.71 ± 6.55	92.42 ± 4.11	0.001
Female	53.0 ± 4.58	94.66 ± 4.5	0.006
Occupation			
Housewife	53.0 ± 4.58	94.66 ± 4.5	0.006
Military	53.0 ± 4.58	94.66 ± 4.5	0.006
employee	64.75 ± 5.73	93.25 ± 2.21	0.006
Watanabe Classification			
Complete	60.0 ± 11.11	94.6 ± 3.2	0.002
Incomplete	64.25 ± 5.9	93.5 ± 2.38	0.006

IV. DISCUSSION

Discoid meniscus is congenital abnormality that is almost exclusively found in the knee's lateral compartment. The etiology of this meniscal malformation has not been established. It is accepted that if an adult has an asymptomatic discoid meniscus, it should not be treated, if the discoid meniscus is symptomatic, surgical treatment is carried out as a general rule [24]. In our study no complications were observed, the number of cases that it was may be the only limitation of study in comparison to another studies. But the advantage no case was missed from follow up. In lysholm score it was clear that significantly increasing after three and nine months compared to score before intervention, which showing the result of partial menisectomy and saucerization in treating symptomatic lateral discoid meniscus which is comparable to other studies: HONG CAO et al. (Renmin hospital) [25] which include 47 patients, lysholm score preoperatively (66.83+/- 8.26) to (91.48+-3.01) after 3 months and to (95.28+-2.01) after 9 months, p- value (< 0.05). And study of Yoo WJ et al. (Seoul university Hospital) [26] which the Lysholm score at a mean of 4.7 years improved to more than 90, regardless of menscectomy method. And study of Hu K et al. [27] which the lysholm score increased from (69.38+/-4.59) before operation to (91.02+/-0.17) at three months then to (92.90+/-3.36) at six months and to (94.74+/-3.52) at twelve months after operation. And study of L. Wasser et al. (Toulouse Teaching Medical Center) [28] which the lysholm score improved from 67(range 41-90) preoperatively to 88(range 55-100) at 37 months follow up. And study of Hagino T et al.(Kofu National Hospital) [29], which the mean Lysholm score was 63.9 before surgery, and improved significantly to 92.3 at the last follow-up (mean 14 months). In study of Yasuo Ohnishi et al.(Wakamatsu Hospital) [30], which Lysholm scores significantly improved from 62.2 ± 16.8 preoperation to 97.7 ± 3.73 at final follow-up (mean follow-up of 30 months) in details of lyshlom score the much difference before and after operation was much clear and significant (p value < 0.05) in (limp score, locking sensation in the knee, pain score, and squatting score), mostly due to seriousness of these symptoms and their effect on daily activities. In Swelling score and climbing score the difference was much significant (p- value < 0.05) only 9 month after operation (long duration) mainly due to gradual improvement and rehabilitation treatment. While in using crutches and giving away sensation from

knee there was improvement but not significant according to p value due to small sample and short period of follow up.

In our study the chief complaint before operation was locking and pain symptoms. In our study according to Watanabe classification 50% of cases were complete type, 40% incomplete, and 10% wrisburg type, with no much difference to other studies. In study of HONG CAO et al (Renmin) [25], study 22 cases from 47 had complete type and 25 cases incomplete with no wrisburg type, In study of Hu K et al. (Soochow study) [25], 22 knees were complete type, 19 knee as incomplete and 1 knee as wrisberg type. According to the Watanabe classification, eight menisci were type I, nine type II, and three type III. In study of Hagino T et al. [30] (According to Watanabe classification, 26 knees (67 %) were complete type (type I) and 13 knees (33 %) were incomplete type (type II). In study of Yasuo Ohnishi et al. (Wakamatsu Hospital) [30], at arthroscopy, DLM was classified as complete in 39 knees and incomplete in 17. There was no Wrisberg-type discoid meniscus ray was the main method in imaging study for diagnosis and follow up for our cases (40% joint space widening, 20% cupping at lateral platue, 40% normal), while MRI was normal in 60% of cases so it mostly depend on availability of (advance imaging center) in hospital. In study of B. Chedal-Bornu et al (Grenoble) [24], the diagnosis was confirmed pre-operatively by MRI in 10 cases, CT-arthrography in 1 case and arthrography in 3 cases. Finally in comparison the result of Lyshlom score before and after operation in relation to ages of patient (less or more than 30 years), sex of patient (male or female), and different occupation of patients (housewife, military, worker), in all of them the difference was significant after operation indicating they have no effect on result of score.

V. CONCLUSIONS

Arthroscopic partial menisectomy is effective method in treatment of lateral discoid meniscus according to the result of Lysholm score. Pain and locking together is the most common clinical presentation of discoid meniscus. The (age, sex, occupation ,and type DLM according to Watanabe classification) have no effect on the result of operation which mean the orthopedics handling and surgical facility determine the outcome of treatment. Long-term follow up in addition to good rehabilitation and follow up needed to check up the result of intervention because not all symptoms will disappear in same time. Patients of lateral discoid meniscus need specialist advanced center for diagnosis of the patients, also record everything in files for long follow including improvement and complication. Discoid Meniscus and other similar cases need more research with large sample and longer follow up period with new functional scores because the seriousness of these clinical presentation and their effect on daily activity. More training for radiologist to find out the discoid lateral meniscus earlier by MRI and X ray to warn the patients about the condition and his limitations to avoid surgery.

Any conflict of interest, any grant or financial profit related with the study: NO

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