Al-Azhar Med. J. *Vol. 45(1), January, 2016, 97-109*
DOI: 10.12816/0026276 ***Issues_title_English:*** 2016 Vol.45 Issue 1

ALL-INSIDE ARTHROSCOPIC MENISCAL REPAIR BY SUTURES WITH PRETIED KNOT ON THE NEEDLE

By

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ABSTRACT

Background: Meniscal tears in younger higher demand patients should be prepared to optimize the healing environment and be meticulously repaired, particularly in the setting of concurrent anterior cruciate ligament reconstruction.

Objectives: Evaluation of results of arthroscopic meniscal repair by sutures with pre-tied sliding knot and preloaded implants on the needle as regard clinical and functional outcome.

Patients and Methods: From June 2012 to June 2015 at Al-Azhar University Hospitals, 30 patients with a mean age of 27 (range, 19-36) years with 30 meniscal tears underwent meniscal repair utilizing the all-inside meniscal repair technique entailing a pre loaded suture anchor. All tears were located at red-red or red-white zones. Concurrent anterior cruciate ligament reconstruction was performed in 15 (50%) of the patients. Patients were evaluated postoperatively based on the Lysholm Knee Scoring Scale, clinical examination, magnetic resonance imaging and 2nd look arthroscopy. Presence of locking, joint line tenderness, effusion, and positive McMurray test were considered to indicate clinical failure.

Results: The mean follow-up was 6 (range: 6-12) months. An average of 2 (range: 1 to 3) suture devices were used per patient. The mean tear size was 20 (range: 10-40) mm. In all, 4 (13.33%) of the tears had failed clinically and 2 (6.66%) appeared unhealed on postoperative imaging. No postoperative extra- or intra-articular complications were encountered.

Conclusion: All-inside meniscal repair using a pre-loaded suture anchor was safe and effective, and yielded an 86.66% clinical and 93.33% radiological success rate.

Key words: Meniscus tear, meniscus repair, vascular area, healing, sutures and rehabilitation.

INTRODUCTION

The medial and lateral menisci are C-shaped fibro-cartilagenous structures lying between the femoral condyles and the tibial plateaus. They provide the crucial function of facilitating weight bearing and contribute to the overall stability of the knee joint. Each meniscus consists of an anterior horn, body and posterior horn **(Fox, 2007).** The size of menisci can vary. However, it is thicker in the periphery and tapers towards the free central edges with sharp margins. The anterior and posterior horns are anchored to the central tibial plateaus by the respective anterior and posterior root ligaments. The transverse intermeniscal ligament connects the menisci anteriorly. Other variations

include oblique menisco-meniscal ligament and unilateral menisco-meniscal ligament. The oblique meniscomeniscal ligament represents a normal variant that connects the anterior horn of one meniscus to the posterior horn of the other. The unilateral meniscomeniscal ligament connects the anterior and posterior horns of the same meniscus **(Fox et al., 2015).**

Many studies have demonstrated the importance of the meniscus in knee function **(Salata et al., 2010 and Mariani, 2011)**. It has also been shown that surgeons should preserve as much meniscal tissue as possible because not just complete but also partial meniscectomy is associated with early degenerative osteoarthritis **(McDermott & Amis, 2006 and Keays et al., 2010)**. To preserve function, it is now suggested that meniscal tears can be treated by meniscal repair instead of meniscectomy. Currently, there are three arthroscopic meniscal repair techniques: inside-out, outside-in, and all-inside. The inside-out technique is reliable and reproducible for repairing meniscal tears, but there is a possibility of damaging the peroneal nerve and vessels over the lateral side, and the saphenous nerve over the medial side. So, most of the time, a posteromedial or posterolateral incision must be made for suture relay. The outside-in technique was initially designed to decrease such neurovascular risks, but was virtually limited to repairing the anterior horn of the meniscus. Systematic review reported success rates of 82% and 85% following inside-out and outside-in techniques, respectively **(Paxton et al., 2011).** To avoid the risk of neurovascular injury and additional wounds, different types of all-inside meniscal repair with biodegradable products (e.g. meniscal arrows) were introduced. Although they could be applied quickly, several reports suggest that such products could cause synovitis and chondral injury **(Anderson et al., 2000 and Bonshahi et al., 2004)**, and their biomechanical pullout strength was markedly inferior to sutures **(Asik & Sener, 2002 and McDermott et al., 2003).** The ultra-fast-fix all-inside meniscal repair device was designed to combine the advantages of the all-inside technique while providing superior biomechanical properties by means of sutures. It contains two 5-mm polymer suture bar anchors that are attached to a No. 0 nonabsorbable braided polyester suture with a pretied sliding knot **(Caborn et al., 2003).**

The present work aimed to assess meniscal repair with the ultra-fast-fix meniscal repair system in a series of patients with meniscal tears.

PATIENTS AND METHODS

This study was a prospective study of thirty cases of post traumatic meniscal tears. All cases were done in Al-Azhar University Hospitals (AL–Hussein and Sayed Galal Hospitals) between June 2012 and June 2015. All patients were 19-36 years old (mean age was 27) without degenerative or arthritic changes in plain radiography. All patients were operated on within two weeks to eight months since date of injury. All cases had meniscal tear with or without ACL injury. They were subjected to clinical examination including history, mechanism of injury, and investigations including plain X-ray and MRI. All cases were subjected to arthroscopic evaluation in order to

confirm the diagnosis and put the criteria of the maneuver needed (repair) according to site, size, and description and associated injury of tear. The decided maneuver was done immediately at the time of arthroscopic examination (repair). All patients provided written informed consent to procedure according to the regulations, and after approval of the Ethical Committee.

The inclusion criteria for this study included clinical symptoms such as locking of the joint, localized pain on medial or lateral joint line, swelling and giving way.

Exclusion criteria were:

- Previous meniscectomy.
- Axial malalignment (>10° of varus or valgus) as assessed by clinical observation.
- Instability as in anterior cruciate ligament [ACL] deficiency if not treated either prior to the meniscal repair or simultaneously.

Repair decision was taken in case of tear within red-red (2mm rim width) or red-white area (2-3.9mm rim width), longitudinal or oblique tear and >10 mm in length without arthritic changes in plain radiography (Table 1).

Table (1): Simplified summary of ISAKOS (International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine) classification of meniscal tears description categories **(Anderson et al., 2012).**

Category	**Descriptors**
Tear depth	Partial or complete
Location/rim width	Zone 1, 2, 3
Radial location	Anterior, middle, posterior
Central to popliteal hiatus	Yes or no
Tear pattern	Horizontal, radial, longitudinal, flap, complex
Quality of meniscus tissue	Degenerative, non-degenerative, undetermined
Tear length	In millimeters

All patients had follow-up for average 6 months, and had a repair by arthroscopic all inside technique by sutures with pretied knot and preloaded implants on the needle. Thus, thirty consecutive patients Lysholm Knee Scoring Scale question-naires **(Lysholm and Gillquist, 1982)** were filled out by every patient 1 week before surgery. Concurrent anterior cruciate ligament (ACL) reconstruction was performed in 15 (50%) of the patients, using hamstring tendons auto-grafts at the time of the meniscal repair.

Surgical technique: At the time of surgery, the meniscal lesions (including length, site, zone, and morphology) were assessed and recorded using a standard documentation system. The technique of meniscal repair was by the ultra-fast-fix device. After the edges of the tear were prepared, the ultra-fast-fix device was introduced into the joint under arthroscopic guidance with the split cannula. The two implants were then inserted to the meniscal fragment and deployed extra-articularly. Depending on the anatomy of the tear, vertical or oblique mattress loops could be utilized. After the needle was withdrawn from the knee joint, the pre-tied self-sliding knots were tensioned and the sutures cut with the aid of the knot pusher–suture cutter **(Caborn et al., 2003).**

For patients who had meniscal repairs, their knee motion was restricted between 0° and 90° for the first 3 weeks post-surgery with partial-weight bearing walking, followed by another 3 weeks with an increased range of motion (between 0° and 120°), and progression to full-weight-bearing walking by postopera-tive week 4. Squatting was prohibited for the first 3 postoperative months. Return to sport was permitted 6 months after repair.

All the patients were assessed by clinical examination and determining the Lysholm score at postoperative weeks 1, 3 and 6. All patients were reassessed at 12, 24 & 48 weeks postoperative by the same score of Lysholm & Gilliquest, MRI after 12 weeks & 2nd look arthroscopy after 24 weeks for 4 cases. The results of the last follow up were analysed. According to the Barrett's criteria **(Barrett et al., 1998),** the repair was considered a failure if there was any joint locking, joint-line tenderness, effusion, or a positive McMurray test.

Patients were examined by magnetic resonance imaging (MRI) 3 months post-surgery. The following sequences were obtained: (1) Sagittal T1-weighted spin echo, (2) Sagittal proton density (PD) fat-saturated spin Echo, (3) Sagittal T2-weighted fat-saturated spin echo, (4) Coronal PD fat-saturated spin echo, (5) Axial T2-weighted fat-saturated spin echo, and (6) Axial PD fat-saturated spin echo. Using the criteria by **Crues et al. (1990)**, a meniscus repair was considered to be a failure if there was a grade-3 signal, that was a linear signal intensity extending to the articular surface, whether to the tibial or the femoral site.

Statistical analysis: Assessments were carried out with respect to patients age, chronicity of tear (elapsed time from injury to repair), length of tear, repair side (medial or lateral), zone of tear (red-white or red-red tear), and concomitant ACL reconstruction. Paired t test was used to compare mean SD preoperative and postoperative Lysholm knee score. P value of <0.05 was considered statistically significant.

RESULTS

There were 9 laterals (30.00%) and 21 medial meniscal tears (70.00%): 19 red-red (63%) and 11 red-white tears (37%). Tear morphologies were listed in table (2). An average of 2 suture devices was used (range, 1 to 3) per patient. The mean tear size was 20 (range, 10-40) mm. The mean follow-up was 6 (range, 6-12) months. No postoperative extra- or intra-articular complications were encountered.

Table (2): Intraoperative findings as regard meniscal tears sites and class.

Classification / Tears site and class	N	%
PHMM vertical longitudinal tear	16	53.33
PHLM vertical longitudinal tear	3	10.00
PHMM bucket handle tear	9	30.00
PHLM bucket handle tear	2	6.67
Total	30	100.00

After 48 weeks, we assessed the patients according to their postoperative score and and we found that 6 patients (20%) had excellent score (98-100 point), 10 patients (33.4%) had good to excellent score (93-97 point), 7 patients (23.3%) had fair to good score (83-92 point), 3 patients (10%) had fair score (66-81point), and 4 patients (13.3%) had poor score (less than 65%point) (Table 3). The preoperative score ranged between 12 and 62 point with a mean of 36.60 point (SD=15.77). The post-operative score assessed after 48 weeks ranged between 51 and 99 point with a mean of 87.52 point (SD= 13.27). The improvement in the score had a mean difference of 50.92 (Table 4).

Table (3): Postoperative score assessment.

Score / Grade	N	%
Excellent	6	20.0
Good to excellent	10	33.4
Fair to good	7	23.3
Fair	3	10.0
Poor	4	13.3
Total	30	100.0

Pre-operative limp score ranged between 0-5 points with a mean of 2.24 points (SD=1.48). The post-operative limp score ranged between 3-5 points with a mean of 4.76 points (SD=0.66). The improvement in the score had a mean difference of 2.25. Pre-operative support score ranged between 3-5 points with a mean of 4.36 points (SD=0.95). The post-operative support score for all patients got 5 points with a mean of 5 point (SD= 0.00). Pre-operative stair climbing score ranged between 0-10 points with a mean of 3.52 points (SD=2.40). The post-operative stair climbing score ranged between 6-10 points with a mean of 8.24 points (SD= 2.03). The improvement score had a mean difference of 4.72 (Table 4).

Pre-operative squatting score ranged between 0-4 points with a mean of 2 points (SD=1.29). The post-operative squatting score ranged between 2-5 points with a mean of 4.44 points (SD=0.71). The improvement in the score had a mean difference of 2.44. Pre-operative walking-instability score ranged between 5-30 points with a mean of 15.80 points (SD=10.48). The post-operative walking-instability score ranged between 25-30 points with a mean of 29.20 points (SD=1.87). The improvement in the score had a mean difference of 13.40. Pre-

operative walking-pain score ranged between 0-20 points with a mean of 4.40 points (SD=5.27). The post-operative walking-pain score ranged between 5-30 points with a mean of 24.40 points (SD=7.54). The improvement in the score had a mean difference of 20 (Table 4).

Pre-operative walking-swelling score ranged between 0-10 points with a mean of 3.28 points (SD=2.99). The post-operative walking-swelling score ranged between 2-10 points with a mean of 7.96 points (SD= 2.88). The improvement in the score had a mean difference of 4.68. Pre-operative atrophy of the thigh score ranged between 0-3 points with a mean of 1.08 point (SD=1.47). The post-operative atrophy of the thigh score ranged between 0-5 points with a mean of 3.12 points (SD=1.45). The improvement in the score had a mean difference of 2.04 and was statistically significant (Table 4).

Table (4): Preoperative and postoperative score assessment.

Score / Assessment		Score Range		Mean ± SD	Paired t test	
					t	p-value
Over-all score	**Pre**	12	-62	36.6 ± 15.77	10.840	<0.001
	Post	51	-99	87.52 ± 13.27		
Limping score	**Pre**	0	- 5	2.24 ± 1.48	10.403	<0.001
	Post	3	-5	4.76 ± 0.66		
Support score	**Pre**	3	-5	4.36 ± 0.354	9.696	<0.001
	Post	5	-5	5 ± 0		
Stair climbing Score	**Pre**	0	-10	3.52 ± 1.445	15.480	<0.001
	Post	6	-10	8.24 ± 1.05		
Squatting score	**Pre**	0	-4	2 ± 0.8879	10.045	<0.001
	Post	2	-5	4.4 ± 0.344		
Walking instability score	**Pre**	5	-30	15.8 ± 5.215	15.216	<0.001
	Post	25	-30	29.2 ± 0.525		
Walking pain score	**Pre**	0	-20	6.54 ± 2.25	14.810	<0.001
	Post	5	-30	24.4 ± 7.54		
Walking swelling score	**Pre**	0	-10	4.54 ± 1.25	1882	<0.001
	Post	2	- 10	7.96 ± 1.22		
Atrophy of the thigh score	**Pre**	0	-3	1.511 ± 0.215	6.193	<0.001
	Post	0	-5	3.12 ± 1.02		

Sixteen patients (53.3%) were below 30 years, while fourteen patients (46.7%) were more than 30 years. The mean post-operative score for the "below thirty group "was 88.38 points (SD=15.02), while patients group more than 30 years had a mean score of 86.58 points (SD=11.67) (Table 5).

Nineteen patients (64%) had done their arthroscopic repair surgery within less than 2 months since date of injury. The mean post-operative score for below 2 months group was 93.13 points (SD=6.96), while patients group; more than 2 months group had a mean score of 77.56 points (SD=16.22) (Table 5).

Nineteen patients (64%) had meniscal tear at the red-red zone (2 mm rim width), while eleven patients (36%) had meniscal tear at red-white zone (23.9 mm rim width). The mean post-operative score for "red-red zone group" was 91.06 points (SD=9); and "red-white zone group" had a mean score of 81.22 points (SD= 17.51) (Table 5).

Eleven patients (36%) had concurrent ACL reconstruction during their meniscal repair, while nineteen patients (64%) had not. The mean post-operative score for the ACL reconstructed group was 88.94 points (SD=10.80), while the other group had a mean score of 85 points (SD=17.28) (Table 5).

Table (5): Correlation between Different Factors and Results.

Factors \ Results		No	Mean ± SD	Paired t test	
				t	p-value
Age (years)	**Less than 30**	**16**	**88.38 ±15.02**	**0.363**	**0.720**
	More than 30	**14**	**86.58± 11.67**		
Time of interval group (months)	**Less than 2**	**19**	**93.13± 6.96**	**3.679**	**0.001**
	More than 2	**11**	**77.56 ±16.22**		
Zone group	**Red-red**	**19**	**91.06± 9.02**	**2.042**	**0.051**
	Red-white	**11**	**81.22±17.51**		
ACL	**ACL reconstruction**	**11**	**88.94± 10.8**	**0.678**	**0.503**
	Non-ACL	**19**	**85.012±17.28**		

Six patients (20%) had displaced bucket handle tear (DBHT) with post-operative mean score of 94.20 points (SD=4.21), nineteen patients (64%) had vertical longitudinal tear (VLT) with post-operative mean score of 87.56 points (SD=11.94), and 5 patients (16%) had bucket handle tear (BHT) with post-operative mean score of 79 (SD=22.39) (Fig. 1).

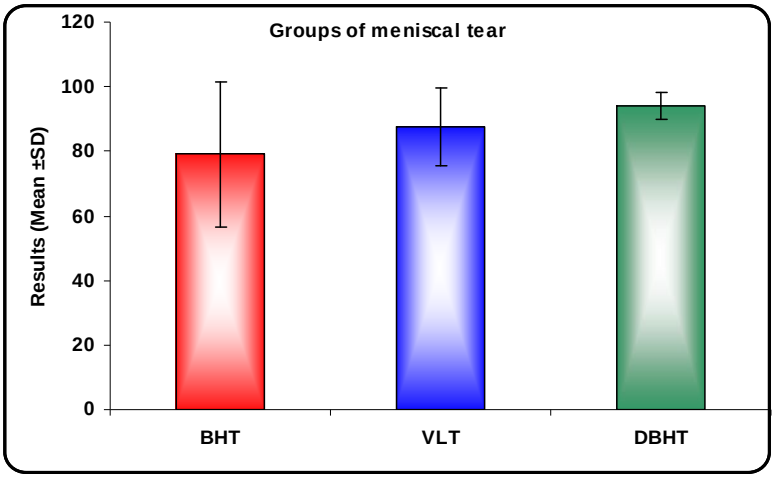

Figure (1): Comparison between postoperative scores regarding type of meniscal tear**.**

DISCUSSION

In our study, the clinical results of 30 repaired menisci using the fast-fix meniscal repair system with an average follow-up of 6 months were presented. Twenty six patients (86.66%) had fair to excellent results, and 4 patients (13.33%) had poor results according to Lysholm scoring system. Evaluation of meniscal healing after meniscal repair was performed using similar clinical criteria by the vast majority of the studies today. Meniscal repair without symptoms postoperatively does not always reflect the true status of the meniscus, and that only second-look arthroscopy can verify healing of the meniscus or not. However, strict criteria were used to identify a clinical result as a success, i.e. Joint-line tenderness, squatting test, and effusion **(Bach et al., 2005).**

Morgan et al. (1991) showed that clinical examination is a reliable method of evaluating the status of repaired menisci. In his study, clinical examination accurately predicted all failures identified by second-look arthroscopy, with no false positives. The clinical results of the present series were also similar to previous reports. Postoperative Lysholm and Tegner activity scores had improved significantly as compared to preoperative data **(Tegner and Lysholm, 1985**). Although the strength of the repair device has a major role contributing to meniscal healing, it is thought that low failure rate is due to the fact that the fast-fix provides a high load at failure and stiffness at the repair site. Two biomechanical studies found that the strength of the fast-fix meniscal repair system is comparable to that of vertical mattress sutures and superior to all the available meniscal devices in the market including the Meniscus Arrow. Even when the device is placed not vertically but horizontally, the load to failure is not reduced **(Asik and Sener, 2002)**

Our study has the advantage of a consecutive series of patients, operated by team surgeons, using the same technique. Many factors such as age, sex, chronicity of tear, length of tear, location of tear, and

ACL reconstruction at the time of meniscal repair influence the outcome of meniscal repair according to reports in the literature **(Krych et al., 2008).** However, disagreement exists regarding the effect of some of these factors on meniscal repair outcome. Our analysis showed that not all of these factors significantly affect the clinical outcome. Some studies reported a higher healing rate (with a success rate of more than 90%) for meniscal tears repaired in first 3 weeks after injury **(Pujol et al., 2008).**

In our study, we found that timing of repair less than month significally affected the outcome of meniscal repair and the post-operative score was higher for younger than 30 years. In our study, we found significant relationship between the length of meniscus tear and the outcome of meniscal repair. This could be explained by the fact that these small tears are present in better meniscal tissue quality and require less blood supply to heal.

Simultaneous meniscal repair and ACL reconstruction creates a more favorable environment for meniscal healing because of greater intra-articular bleeding and fibrin clot formation **(Gallacher et al., 2012).** However, **De Haven and Kenneth (1999)** reported that they had only 4% failures in isolated meniscal repairs with rim width less than 3 mm. In their opinion, rim width is the primary factor and not simultaneous ACL reconstruction. In one study, clinical experience with the meniscal arrow revealed a 90.6% success rate at 2 years in patients undergoing concurrent ACL reconstruction **(Gill and Diduch, 2002).**

Kurzweil et al. (2005) reported an overall failure rate of 28% with the meniscus arrow at average follow-up of 54 months. Furthermore, in isolated meniscal repairs using arrows without concurrent ACL reconstruction, the failure rate was a striking 42%. Yet another study reported a failure rate of 41% at 4.7 years **(Gifstad et al., 2007).** In our study, we found the post-operative mean score was higher for the cases which had concurrent ACL reconstruction operation during their meniscal surgery.

Isolated meniscal repairs have a lower success rate than do repairs done in conjunction with ACL reconstruction. Additionally, meniscal tears with rim widths of <3 mm, those resulting from acute injuries and those involving the lateral meniscus, seem to have a greater potential for healing **(Greis et al., 2002). Grant et al. (2012)** performed a systematic review comparing 19 studies looking at different repair techniques for isolated meniscal tears. They found no differences in clinical failure rate or subjective outcome between inside-out and all-inside meniscus repair techniques. Complications were associated with both techniques. More nerve symptoms are associated with the inside-out repair, and more implant-related complications are associated with the all-inside techniques. **Nepple et al. (2012)** found similar results in a systematic review of 13 studies with a minimum of five years follow-up. A pooled rate of failure from 20.2% to 24.3% was found for all repair techniques.

Rubman et al. (1998) evaluated arthroscopic repair of meniscal tears extending into the avascular zone. In their study, lateral meniscus tears fared better, and a

trend was seen toward improved results with meniscal repair done within 10 weeks of injury. The authors concluded that the benefits of repair justify this procedure despite a 20% rate of revision surgery, and a 36% rate of failure in those evaluated arthroscopically. They suggested that the benefits of a potentially functional meniscus outweigh the risks of revision surgery and recommended that repair be done for tears that extended into the avascular portions of the meniscus. Biomechanical studies have demonstrated favorable results with fast-fix. Strength and load-to-failure characteristics were reported to be not only comparable to mattress suture constructs, but also significantly better than earlier-generation devices **(Barber and Herbert, 2000).**

A prospective study of 42 meniscal tears repaired with the fast-fix with 2-year follow-up revealed success rates of 91% and 80% in patients with and without concurrent ACL reconstruction, respectively. No complications were reported. At the time of the second-look arthroscopy in 8 knees, the sutures were noted to be nearly or completely incorporated into the meniscal tissue, and no chondral damage was documented **(Haas et al., 2005).**

The principle disadvantages of the present study were the small number of cases, the lack of a control group, and the limited observation period. There were no complications directly associated with the device in the present series such as broken implants, synovitis, or migration of the implants as has been reported for other devices. There were technical difficulties in advancing the trigger for aiming the second anchor and failure of the suture during tightening which required removal of the suture and replacing it with another one. Pull out of sutures occurred in 2 patients during suture tightening due to improper placement of the fast-fix anchors. The cost of the fast-fix was one of the difficulties facing us in our study. Inappropriate use of the instrumentation may prolong surgical time and result in iatrogenic meniscal or cartilage injury.

Arthroscopic all-inside repair with the fast-fix device appeared to be a safe and effective procedure with a high success rate. There were no neurovascular or other major complications directly associated with the use of the device. We had no other complications directly associated with the suture in our series. We agreed with **Barber et al. (2012)** in that since the implants of the fast-fix are embedded into the peripheral capsule chondral injury is unlikely to occur**.** The absence of a control group in our study to compare the fast-fix meniscal repair system to another alternative method was a limitation of our study. It would be interesting if future studies could be conducted to compare this device with traditional suture techniques or other meniscal repair devices.

CONCLUSION

Arthroscopic all inside meniscal repair by sutures with pretied knot on the needle was safe and effective in the short term. A success rate of 86.66% (clinically) and 93.33% (radiologically) was observed.

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خلفية البحث: إصلاح القطع الموجود في الغضاريف الهلالية يكون بالفتح الجراحي الكامل أو بمساعدة المنظار أو بالإستخدام الكامل للمنظار في كل مراحل العمل الجراحي ، ولقد أصبح الإصلاح الغضروفي أكثر جدوى بسبب تطور معدات المنظار و تحسن الأداء الجراحي.

الهدف من البحث : إصلاح قطع الغضروف الهلالي بالركبة بواسطة المنظار الجراحي و إبر ذات غرز سابقة التحضير.

المرضي وطرق البحث: أجري هذا البحث علي ثلاثين مريضا يعانون من قطوع بالغضاريف الهلالية بمستشفيات جامعة الأزهر بالقاهرة خلال الفترة من يونيو 2012 وحتي يونيو 2015. و كانت الحالات تتراوح أعمارها بين 19-36 سنة وبلغ عدد الذكور 27 حالة وعدد الإناث ثلاث حالات . وقد تم تحديد إختيار هؤلاء المرضي بناء علي التاريخ المرضي و أعمارهم و فحصهم إكلينيكيا و عمل الأشعة التشخيصية اللازمة لهم. و كان التشخيص النهائى بالمنظار قبل الجراحة مباشرة والذي بناء عليه كان الإختيار بين تصليح القطع الموجود أو تركه أو إستئصاله.

وكانت عدد الحالات التي تعاني من قطع بالغضروف الإنسي واحد وعشرين حالة ، والغضروف الوحشى تسع حالات، وخمس عشرة حالة كانت مصابة بقطع في الرباط الصليبي الامامي وتم تصليحه في نفس الجراحة. وقد تم إصلاح وتثبيت الغضروف كليا من الداخل بالمنظار بواسطة إبر ذات غرز سابقة التحضير في جميع الحالات .

وقد تم التشخيص بالتاريخ المرضي وفحص الإصابة، وشكوى المصابين بقطع الغضروف كإحساس بالألم و تورم وإضطراب وظيفة الركبة مع عدم ثباتها، والفحص الإكلينيكي الشامل، وإجراء الإختبارات الخاصة بقطع الغضروف مثل إختبار ماكموري وإختبار آبلى و غيرها، ثم الأشعة التشخيصية كالأشعة السينية و أشعة الرنين المغناطيسي.

النتائج :كان التقييم الكلي قبل الجراحة يتراوح بين 12-62 نقطة بمتوسط 36.6 نقطة، ثم كان بعد الجراحة بستة أشهر يتراوح بين 51-99 نقطة بمتوسط 87.52 نقطة. وكانت النتائج جيدة ومرضية في 26 حالة (86.66%) وغير مرضية وضعيفة فى 4 حالات(13.33%).

الإستنتاج : إستئصال الغضروف المصاب يكون في أضيق الحدود، و تصليح قطوع الغضروف بالمنظار هي أفضل طريقة للحفاظ عليه ولحماية مفصل الركبة من أي مضاعفات ثانوية قد تحدث له.