Original Research Paper

Volume : 5 | Issue : 10 | October 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Results of Arthroscopic Menisectomy For Medial Meniscus Horizontal Tears in Patients Under Age 45

Medical Science

KEYWORDS : Dynamic Hip Screws(DHS), Intertrochantric fractures, Harris Hip Score, Proximal Femoral Nail(PFN).

Dr Pathik Vala	Senior Resident, Department of Orthopaedics, Smt. NHL Municipal Medical College, V.S. Hospital, Ahmedabad.
Dr Mehul Vardey	Senior Resident, Department of Orthopaedics, Smt. NHL Municipal Medical College, L.G. Hospital, Ahmedabad
Dr Ajay Devda	Senior Resident, Department of Orthopaedics, Smt. NHL Municipal Medical College, V.S. Hospital, Ahmedabad
Akshay Chavada	Post Graduate Student, Department of Orthopaedics, Smt. NHL Municipal Medical College, V.S. Hospital, Ahmedabad.

ABSTRACT

Background and Objectives:

The purpose of this study was to evaluate the demographics,Clinical Features and outcomes of arthroscopic partial menisectomy(APM) for isolated medial meniscus horizontal cleavage tears(MMHCTs) in patients under the age of 45 years of age.

Materials and Methods

We retrospectively reviewed 98 patients(100 knees) under 45 years who underwent APM for MMHCTs.Clinical outcomes were assessed under International Knee Document Committee(IKDC) subjective core.Tegner activity scale,Visual analog Scale(VAS) score,and a question on the symptom relief.

Results

79% were male and 70% had no trauma.The mean symptom duration was 10 months.At arthroscopy,a flap tear was identified in 75%.At a mean 19 month follow-up,the IKDC subjective score,Tegner activity score and VAS score were significantly improved compared to the preoperative values(p=0.025,p=0.043,p=0.032 respectively).While 85% were free of symptoms,15% had persistent pain.No significant differences in outcomes were observed based on the tear type and the presence of flap tears.No progression or development or radiographic degenerative changes was observed in all knees.

Conclusions

Demographics of MMHCTs under 45 showed a male dominance and higher frequency of no traumatic tears.APM was beneficial to Symptomatic HCTs in this cohort during the short term follow up.Type of HCTs and combined flap tears didn't affect clinical outcomes.

Introduction

Horizontal Cleavage tears(HTC) can occur as result of degeneration cause by shear force with or without a discrete injury and can extend to the inferior articular surface or the free edge of the meniscus1.The immobility of the medial meniscus posterior horn(MMPH) makes it vulnerable to tears.HCTs are common in the middle –aged or older patients and the prevalence increases with the age2,3,4..A large scale study of the middle aged and elderly patients reported that 35% had degenerative HCT2.Howevr ,HCT can also occur in younger patients5,6,7.Terzidis et al7. Reviewed 379 isolated meniscal tear in young atheletes and found that 22.5% of the tears were HCTs.As HCT can result in changes in the tibiofemoral contact mechanics that may lead to cartilage destruction 8.,it is mandatory to know the characteristics and natural course of HCT in younger patients.Causes,clinical features and natural courses of HCT in younger patients may differ from those i the middle aged and elderly patients.However ,little is known about the demographics,clinical features and treatment outcomes i younger patients with MMPH HCTs.

Treatment options for symptomatic HCTs include menisectomy and repair when the conservative treatment fails 9,10.A recent systematic review has suggested promising outcomes of repair of HCTs9,however,the classic approach has been APM due to poor healing potentials after repair 11,12,13,14.Most previous studies have reported the results of APM in middle aged and elderly patients and the benefits of arthroscopic surgery for degenerative meniscus tears are still debatable in these patients 10,15,16,17.As the articular cartilage is likely to be healthier in younger population,prognosis in these patients can be expected to be better than that in the older patients.However there is limited literature reporting clinical outcomes and prognosis following APM for HCTs in younger patients and middle aged patients.

The purpose of this study were to investigate the demographics of MMPH HCTs and clinical outcomes of APM on patients under age 45..In addition we investigated differences in demographics and clinical outcomes according to tear morphology and the presence of combined flap tears. Given HCTs and articular cartilage in younger patients are not degenerative,we hypothesized that 1)APM would resolve symptoms and provide satisfactory outcomes,2) Clinical features and outcomes would be different depending on the horizontal tears morphology and the presence of combined flap tears 3)HCT with a flap tear would be more symptomatic than HCT without a flap tear,and 4)resultantly clinical outcomes would be better in patients with combined flap tears than those without flap tears

Materials and Methods

This study was conducted using medical records,magnectic resonance imaging (MRI) scans, and arthroscopic images were reviewed for patients who underwent arthroscopic surgery for meniscus tears between 2013 and 2015.Inclusion criteria for this study were patients with 1)medial meniscus HCTs,2)partial menisectomy for meniscal tears,3) normal or minimal radiographic arthritic changes,4)International Cartilage Repair Society Grade 1 and 2 cartilage lesions,and 5)<45 years of age .Patients were excluded if they had combined cruciate or collateral ligament injuries of the knee,lateral meniscus tears,Fractures around knees,previous surgeries on the same knee, and inflammatory arthritis of the knee.Data such as sex,age,body mass index(BMI),presence of trauma(sports injury or accident)

vausing acute onset of pain,primary symptoms,Clinical signs,physical examination,and time from the onset of symptom to clinic visit were collected from medical records.

Preoperative diagnosis was confirmed using MRI(1.5T to 3.0T) in all patients.MMPH HCTs were classified according to the presence of intrarticular extension on the saggital MRI scans that extends from the central part of the mid body to the posterior root of the medial meniscus.A type 1 tear was defined as a horizontal tear that transacted the meniscus horizontally to the inner margin of the MMPH with no interaarticular exit.A type 2 tear was defined as a horizontal tear that extended to the inferior articular surface of the MMPH.Arthroscopic findings were reviewed using photos and intraoperative notes.The types of HCTs and the presence of meniscus flap fragments and pathologic lesions of the articular cartilage were assessed in each patient.If the type of HCT was different between MRI and arthroscopy,the arthroscopic type was selected for analysis. The meniscal flap fragment was defined during arthroscopy as an easily displaceable tear that had free edges.Two independent observers reviewed the MRI scans and arthroscopic findings in a 2-week period to ensure reliability.

1.Arthroscopic Intervention

Our indication for surgical intervention for MMPH HCTs in younger patients was localized pain combi9ned with discomfort during high flexion such as cross leg sitting and squatting.

All patients underwent a similar rehabilitation program postoperatively.Medications were prescribed postopeatively for two week and discontinued.Full range of motion without load and full weight bearing werew encouraged immediately postoperatively.Squatting with full flexion was not allowed for 1.5 months postoperatively.Patients were allowed to return to previous sports activities 3 months after operation

2.Radiological and clinical outcomes

Pre and post operative mechanical axis of the lower extremity and degeneratice changes were evaluated using preoperative and last follow up plain radiographs including the bilateral standing lower extremity,both knee 45 degree flexion posterior anterior view,both knee standing 30 degree flexion view lateral view and both knee skyline view.Clinical outcomes were assessed using International Knee Document Committee(IKDC) subjective score,VAS score, and a single question on the resolution of symptoms compared to the preoperative status.

3.Statistical Analysis.

Demographic variables and clinical outcomes of HCT presence of combined flap tear and resoilution of symptoms.The independent samples t-test and chi-square test were used for the statistical analysis.The reliability of the MR classification and arthroscopic classification of the HCT type was assessed.Inter and intraobserver reliability was defined as follows;<0,poor agreement;0-0.20,slight agreement;0.21-0.40,fair agreement;0.41-0.6,moderate agreement;0.61-0.8,Substantial agreement;0.81-1.almost perfect agreement18.All analysis were performed with SPSS.A p value <0.05 was considered stastically significant.

Results

1.Demographics

A total of 100 knees in 98 patients met the inclusion and exclusion criteria and they were included in the study(Table 1).The mean age of the included patients was 40 years.There were 79 knees in male patients and 21 knees in female patients.Seventy knees had no significant trauma event.(Table 2).The most common preoperative symptom was pain during walking(56%),followed by pain during deep flexion(31%),locking of the knee(8%),and a giving way sensation(2%).Eighty knee had positive medial joint line tenderness preoperatively.

Both arthroscopic and MRI classification exhibited almost perfect agreement in an interobserver and two intraobserver reliability tests(table 3);45 knees had type 1 HCTs and 55 knees had type 2 HCTs.The number of nontraumatic tear was significantly differ between type1 and type2 HCTs,while no significant differences were observed in other demographics.

2.Arthroscopic Findings

During arthroscopy ,no torn menisci appeared repairable due to the long after the onset of symptoms(average,10 months).Combined flap tears were identified in 75 knees. Patients with a flap tear tended to have more non traumatic tears and significantly shorter symptom duration to surgery than those without a flap tear(p=0.018 and p=0.009)(table 4).However ,no significant differences were observed in other variables between patients with a flap tear and without a flap tear.Pathologic cartilage lesions observed with arthroscopy are presented in(table 5)

3.Clinical Outcomes

There were no postoperative complication and no additional surgeries after the index surgery in all knees.At the last follow up,the mean IKDC score,Tegner score,VAS score significantly improved compared to the previous values.85% were symptom free and engaged in previous activities after the index surgery,while 15% had persistent pain during daily activities.There was no significant differences in age,sex ratio,BMI,cause of injury,HCT type,Preoperative clinical scores between patients who were free of symptoms and patients who had persisitent pain.No significant differences were found in outcomes based on the types of HCTs and the presence of combined flap tears.

Minimum 36 month followup outcomes were available for 39 knees;31 knees were free of symptoms and engaging in previous activities after the index surgery,while 8 knees had persistent pain during daily activities.Significant differences were found in the mean preoperative VAS score(3.7 vs 2.5) and symptoms duration(21 months vs 6 months) between patients who were free of symptoms and patients who had persistent pain.

No progression or development of radiographic degenerative changes was observed in all knees at the last follow up.

Table 1.Demographics of medial meniscus posterior horn horizontal cleavage tears.Types of horizontal tears.

Characteristic	Type1 (n=45)	Type 2(n=55)	Total	P value
Age	37+-8.7	39+-9.1	40+-8.1	NS
Sex	37/8	42/13	79/21	NS
BMI	24+-3	24+-3	24+-3	NS
Related to trauma	20/25	10/45	30/70	0.005
Kellegren-Lawrence grade				
Grade 0	39	48	87	
Grade 1	6	7	13	

Volume : 5 | Issue : 10 | October 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Preop Mechanical HKA angle	178+-2	179+-3	178+-2	NS
Symptom duration	6+-13	13+-11	10+-18	NS
Positive joint tenderness	89	73	80	NS
Arthroscopic confirmed flap tear	80	73	75	NS
Symptom improvement				
Free of symptoms	82	89	85	NS
Persistent	18	11	15	NS
Preop IKDC score	43+-2.5	41+-1.9	42+-2.1	NS
Postop IKDC score	87+-2.5	89+-1.8	88+-1.7	NS
Preop median tegner score	3	3	3	NS
Post op tegner score	5	5	5	NS
Preop VAS score	3.2+-1.3	3.3+-1.8	3.2+-1.7	NS
Post op VAS score	0.9+-0.7	0.7+-0.8	0.7+-0.7	NS
Mean follow up period	19+-23	19+-20	19+-20	NS

Table 2.Demographics of medial meniscus posterior horn horizontal cleavage tears according to the presence of trauma

Characteristic	Traumatic (n=30)	Non traumatic (n=70)	p-value
Age	35+-6	49+-7	NS
Sex	29/1	50/20	0.002
BMI	24+-4	24+-3	NS
Tear type 1	70	34	0.005
Kellgren Lawrence grade			
Grade 0	29	58	
Grade 1	1	12	
Preop Mechanical HKA angle	178+-3	178+-2	NS
Symptom duration	2+-1	16+-26	0.003
Positive joint line tenderness	60	81	0.005
Arthroscopically confirmed flap tear	90	66	0.010
Symptom improvement			
Free of symptoms	80	89	NS
Persistent	20	11	NS
Preop IKDC score	44+-5.2	43+-4.1	NS
Postop IKDC score	88+-3.5	87+-5.8	NS
Preop median tegner scale	3	3	NS
Postop tegner scale	5	5	NS
Preop VAS score	2.9+-1.6	3.3+-1.3	NS
Postop VAS score	0.3+-0.6	0.8+-0.6	NS
Mean follow up period	21+-31	18+-32	NS

Table 3 : Inter and Intraobserver reliability tests for horizontal cleavage tear classification.

Characteristics	MRI	Arthroscopy
Interobserver		
Weighted k	0.936	0.897
95% CI	0.882-0.991	0.820-0.919
Intraobserver 1		
Weighted k	0.901	0.911
95 % CI	0.770-1.000	0.841-0.986
Intraobserver 2		
Weighted k	0.802	0.873
95% CI	0.620-0.984	0.787-0.950

Table 4 : Demographics of medial meniscus posterior horn horizontal tears according to the presence of flap tear.(Based on horizontal flap tear)

Characteristic	Flap(+)	Flap(-)	p-value
Cases	74	26	
Age(yr)	38+-9	40+-9	NS
Sex(m/f)	61/13	18/8	NS
BMI	24+-3	23+-3	NS
Related to trauma	47/27	23/3	0.018
Kellegren-Lawrence grade			
Grade0	68	19	
Grade1	6	7	
Preop mechanical HKA angle	178+-2	178+-2	NS
Symptom duration	6+-10	21+-31	0.009
Positive joint line tenderness	76	81	NS
Symptom improvement			NS
Free of symptoms	89	85	NS
Persistent	11	15	NS
Preop IKDC score	43+-5.2	46+-3.1	NS
Postop IKDC score	87+-5.3	89+-6.4	NS
Preop median Tegner scale	3	3	NS
Postop median Tegner scale	5	5	NS
Preop VAS pain score	3.1+-1.2	3.5+-1.7	NS
Postop VAS pain score	0.6+-0.7	0.9+-0.7	NS
Mean followup period	19+-25	21+-26	NS

Table 5 : Pathologic Cartilage Lesions Confirmed during Arthroscopy. Grading according to International Cartilage Society.

Characteristic	Grade 0	Grade 1	Grade 2
Medial femoral condyle	88	2	10
Medial tibial plateau	97	0	3
Lateral femoral condyle	100	0	0
Lateral Tibial Plateau	99	0	1
Patella	98	0	2
Trochlea	98	0	2

Discussion

Although HCT are more common in older patients,they can occur in younger patients.This study investigated the demographics and clinical outcomes following arthroscopic menisectomy for HCTs in patients who were younger than 45 years of age and relatively healthy cartilage condition.We found that demographic characteristics of less than $5 years old patients with MMPH HCTs are male dominance(79%),higher prevelance of non traumatic tears(70%),aa]nd tolerable symptoms.At a mean of 19 months of follow up 85% were free of symptoms with no progression of radiographic degenerative changes after partial menisectomy.Contrary to our hypothesis,no significant differences were seen in the outcomes according to the type of HCT and the presence of a combined flap tear.Our study suggests the evidence the younger patients with symptomatic HCTs benefit with the APM,although the superiority of menisectomy over other treatment methods will be further investigated.This information can be helpful in

determining the treatment plan for symptomatic HCTs in younger patients.

The etiology of HCTs in younger patients remains unknown. Previous studies suggested that HCTs in younger patients may occur due to overuse or trauma rather than degeneration unlike the older patients7.In present study ,70% of patients showed no history of trauma.Our Findings were similar to those of Kim et al13 study on isolated HCT in patients less than 40 years old.They found no significant differences in age,sex,duration of symptoms,physical assesements,pre/post operative Lysholm score and IKDC score.Further study will be required to determine the etiology and natural course of non traumatic HCT in younger patients.

Many flap tears begin with HCTs.In our series ,the displaceable flap tears were founds in 75 knees(75%) during arthroscopy.The clinical significance of a flap tear is that it can be displaced centrally or peripherally ,leading to mechanical symptoms,which requires arthroscopic management19,20,21,22.We found that HCTs without a flap tear had significantly shorter duration of symptoms to operation compared to HCTs without a flap tear.Once a tear in the meniscus becomes of significant size,more obvious symptoms of giving way and locking may develop.

A HCT divides the meniscus into superior and inferior leaves resembling a fish mouth or it extends to the superior or inferior articular surface,developing into a superior or inferior flap tear.1,23.No significant differences were observed in the frequency of flap tears and preoperative VAS pain score between type 1 and type 2 HCTs except the longer presentation time in type 2 HCT.Further long time followup studies will be required to determine the clinical significance of our HCT classification.

Varus alignment,Old age,high BMI and greater severity of joint degeneration have been documented as poor prognostic factors of partial menisectomy in middle aged or older patients24,25,26.In present study,15% had no improvement with persistent pain after partial menisectomy at an average 19 months followup.There is no significant differences in preoperative demographics between patients who were post operatively free of symptoms and patients who had no post-operative improvement,except for the joint line tenderness.Further studies will be needed to determine whether younger patients with HCTs have better outcomes after arthroscopic menisectomy compared to older patients with HCT.

Our study has several limitations.First,isolated MMPH HCTs are relatively rare in patients under 45 years of age;thus only a small number of cases were evaluated although few years of medical records were evaluated.Some patients may have had clinically occluded displaced meniscal tear fragments that were missed on preoperative MRI and thus these patients might not have been included in the study.Also the retrospective and small number of failure cases limited our ability to identify risk factor for poor prognosis.,Despite this limitation we believe our demographic data and analysis help improve understanding of the characteristics of MMPH HCTs in younger patients.

Conclusions

Demographics of MMPH HCTs under the age of $5 years showed male predominance and higher prevalence of non traumatic tears.APM was beneficial to symptomatic HCT in this cohort during the short time follow up.The type of HCTs and combined flap tears did not affect the clinical outcomes

Conflict of Interest

No potential conflict of interest to this article was reported

References

1. Nguygen JC,De smet AA,Garf BK,Rosas HG,MRI based diagnosis and classification of meniscal tears Radiographics 2014;34:981-999
2. Englund M,Meniscal tear;a feature of osteoarthritis,Acta Orthop Scand Suppl 2004;75:1-45
3. Christoforakis J,Pradhan R,Sancheaz-Ballester J,Hunt N,Strachan RK.Is there an association between articular cartilage changes and degenerative meniscus tear?Arthroscopy 2005,21;1366-69
4. Noble J,Hamblen DL,The pathology of the degenrste meniscus lesion JBJS 1975;57:180-86
5. Pujol N,Bohu Y.Clinical outcomes of open meniscal repair of horizontal meniscal tear in young patients.Knee Surg Sportd Traumatol Arthose 2013:21;1530-33
6. Bierdert RM,INtrasubstance meniscal tears.Clinical aspect and the role of MRI,Arch Orthop Trauma Surg 1993;112:142-147
7. Terzidis IP,Christodoulou A,Meniscal tear characteristics in young atheletes with a stable knee:arthroscopic evaluation.Am J sports Med 20056:34;1170-75
8. Arno S,Bell CP.Tibiofemoral contact mechanics following a horizontal cleavage lesion in the posterior horn of medial meniscus.J Orthop Res 2015:33;584-90
9. Kurzweil PR,Lynch NM.Repair of horizontal meniscus tears;a systematic review Arthoscopy 2014;30:1513-19
10. Gauffin H,Tagesson S,Meunier A,Knee arthroscopic surgery is beneficial to middle aged patients with meniscal symptoms,a prospective randomised,single blinded study.OsteoarthrtisCartilage 2014;22:1808-16
11. Kim YM,Joo YB.Role of mechanical axis of lower limb and body weight in the horizontal tear and root ligament tear of the posterior horn of medial meniscus.Int Orthop 2012,36:1849-55
12. Kim JM,Bin SI,Inframeniscsl portal for horizontal tears of the meniscus,Arthroscopy 2009;25:269-73
13. Kim JR,Kim BG,Traumatic and non traumatic isolated horizontal meniscal tears of the knee in patients less than 40 years of age.Eur J Orthop Surg Traumatol 2013;23;589-93
14. Kim SJ,Lee SK.Does decreased meniscal thickness affect surgical outcomes after medial menisectomy?Am J Sports Med 2015;43;937-44
15. Herrlin SV,Wange PO,Is arthroscopic surgery beneficial in treating non traumatic ,degenerative medial meniscla tears? A five year follow up.Knee Surg Sports Traumatol Arthosc 2013;21:358-64
16. Sihvonen R,Paavola M.Arthroscopic partial menisectomy versus sham surgery for a degenerative meniscal tear .N Engl J Med 2013;369:2515-2524
17. Khan M,Bedi A,Arthroscopic Surgery for degenerative tears of meniscus;a systematic review and metaanalysis,CMAJ 2014;186:1057-64
18. Landis JR,Koch GG,The measurement of observer agreement for categorical data,Biometrics 1977;33:159-174
19. Vande Berg BC,Malghem J,Meniscal tears with fragments displaced in notch and recesses of knee,MRI with arthroscopic comparison,Radiology 2005;234:842-50
20. Lecas LK,Helms CA,Inferiorly displaced flap tears of the medial meniscus,MR appearance an clinical significance,AJR Am J Roentgenol 2000,174:161-64
21. Lance V,Heilmeir UR.MRI characteristics and clinical symptoms related to displaced meniscal flap tears,Skeletal Radiol 205;44:375-84
22. McKnight A,Southgate J,Price A,Meniscal tears with displaced fragments:common patterns on MRI.Skeletal Radiol 2010;39-279-83
23. Huysee WC,Verstraete KL.Meniscus Imaging.Semin MSK Radiol 2008;12:318-333
24. Erdil M,Bilsel K,Sungur M,Does obesity negatively affect the functional results of arthroscopic partial menisectomy?a retrospective cohort study:Arthroscopy 2013;29:232-37
25. Kijowski R,Woods MA,McGuine TA,Wilson JJ,Graf BK,De Smet AA,Arthroscopic partial menisectomy;MR imaging for prediction of outcome in middle aged and elderly patients,radiology 2011;259:203-212
26. Katz JN,Meredith DS,Lang P,Creel AH,Yoshioka H,Neumann G,Fossel AH,De Pablo p,Losina E,Association among preoperative MRI features and functional status following arthroscopic partial menisectomy.Osteoarthritis Cartilage 2006;14:418-22