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Degenerative meniscal lesions: Conservative versus surgical management

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Abstract. *Introduction:* Degenerative meniscal lesion (DML) typically occur in middle-aged patients without any history of significant acute trauma. Its prevalence increases with age and are associated with knee osteoarthritis (OA). The most frequent orthopedic treatment is arthroscopic partial meniscectomy (APM) to relieve pain and functional deficit associated with DML. The aim of the present narrative review is to focus on the guidelines of DML treatment in middle aged patients. *Methods:* A review was conducted of PubMed articles from January 1, 2000 to December 31, 2020 using a combination of the following keywords: knee, osteoarthritis, degenerative meniscal lesion, degenerative meniscal tear, and arthroscopic partial meniscectomy. *Results:* A total of 12 papers were included in the present narrative review. Of these, 3 papers assessed the clinical outcome of patients with DML treated conservatively and 9 papers compared the clinical outcome of patients with DML, with or without mechanical symptoms, treated with APM versus conservative therapy or APM versus sham surgery. *Discussion:* International guidelines recommend that DML in the presence of knee OA should be managed by conservative therapy rather than APM. Recent studies have demonstrated that even in the absence of radiographic signs of knee OA, with or without mechanical symptoms, there was no advantage of APM over conservative therapy of patients with DML. Moreover, APM offer no further advantage for knee symptoms or function compared with sham surgery. Numerous predictive factors of poor results after APM for DML have been identified in the current literature including age at surgery, female sex, obesity, meniscal extrusion, duration of the clinical symptoms, bone marrow edema, a low pre-operative score, complex meniscal lesions, larger meniscectomy, lateral meniscectomy advanced cartilage injuries and misalignment. *Conclusion:* Many randomized controlled clinical trials recommend against APM as the first-line treatment for managing knee pain in patients affected by DML and no radiographic knee OA that should be reserved for cases of failure after 3 month conservative therapy or earlier in patients with major knee mechanical symptoms. Nevertheless, surgeons should inform patients that APM in the presence of negative prognostic factors is associated with poor clinical outcome. (www.actabiomedica.it)

Key words: knee osteoarthritis, degenerative meniscal lesion, arthroscopic partial meniscectomy, physical therapy, conservative therapy, sham surgery

Introduction

Menisci has numerous functions, such as load-bearing, load transmission, shock absorption, stabilization of the knee during movement and loading, and lubrication of the knee joint (1, 2). Meniscal lesions are the second most frequent injury of the knee (3). These injuries can be divided into two groups: traumatic and degenerative lesions (3). Degenerative meniscal lesions (DML) typically occurs in middle-aged

patients without any history of significant acute trauma (4). Its prevalence increases with age and are associated with knee osteoarthritis (OA) (2, 5, 6).

Older age, male sex, body mass index> 25, work related kneeling or squatting, and ascending stairs are risk factors for DML (7). Patient history and findings from clinical examination are fundamental for the clinical diagnosis of DML (5). Signs and symtoms of DML includes: recent onset of knee pain, locking, catching sensation, effusion, swelling, clicking, popping, buckling, and giving way (4, 7). Furthermore, McMurray test, Apley grind test, the presence of joint line soreness and lack of complete extension can be helpful in the evaluation of symptomatic DML (8). Nevertheless, all these signs and symptoms are not specific and have limited diagnostic accuracy (7). Weight-bearing knee radiographs is the first line imaging modality for the assessment of middle-aged patients with painful knee to exclude other sources of knee pain, such as osteoarthritis (9). Whereas, MRI is indicated when knee radiographs do not show OA and a meniscal lesion is suspected to assess not only its presence, but also its location, extension and displacement (3).

The most frequent orthopedic treatment is arthroscopic surgery to relieve pain associated with DML. In the United States, approximately 700 000 arthroscopic partial meniscectomies for DML are carried out annually (10). The efficacy of this technique, however, has been questioned by recent evidence from several randomized controlled trials (RCTs) (8). Therefore, the aim of the present narrative review is to focus on the guidelines of DML treatment in middle-aged patients.

Methods

A review was conducted of PubMed articles from January 1, 2000 to December 31, 2020 using a combination of the following keywords: knee, osteoarthritis, degenerative meniscal lesion, degenerative meniscal tear, and arthroscopic partial meniscectomy (APM). The most relevant and recent RCTs and case series focusing on the guidelines of DML treatment were reviewed. Additional studies have been found by examining the reference lists of the above articles. Exclusion criteria were: traumatic meniscal lesion, non English, and case report studies.

Results

A total of 12 papers (1, 3, 10-19) were included in the present narrative review. Of these, 3 papers (1, 3, 11) assessed the clinical outcome of patients with DML treated conservatively and 9 papers (10, 12–19) compared the clinical outcome of patients with DML, with or without mechanical symptoms, treated with APM versus physical therapy (12–15, 19) or APM versus sham surgery (10, 16–18). Ten papers (3, 10, 12–19) were RCTs (Level of Evidence I), and two studies (1, 11) were prospective case series (Level of Evidence IV). A summary of these studies is shown in Table 1 and Table 2.

Table 1. Details of studies assessing patients with DML treated conservatively.

Author	Type of study	Treatment	Clinical scores	Patients	Mean age, years	Latest followup, months
Zorzi et al. 2016 (3)	RCT	IA injections + conservative therapy (ice applications, rest and knee off-loading and paracetamol intake as needed) vs conservative therapy	SF-36, WOMAC, VAS	25 vs 17	30 vs 33	2
Mitev et al 2019 (11)	Case series	PRP injections	TLK	15	49,3	6
Berton et al. 2020 (1)	Case series	IA injections	SF-36, PPtGA, CoGA, WOMAC	40	47	2

Abbreviations: SF-36, Short Form-36; WOMAC, Western Ontario and Mc Master University; VAS, Visual Analog Scale; TLK, Tegner Lysholm Knee; PtGA, Patient's Global Assessment; CoGA, Clinical Observer Global Assessment.

Table 2. Details of studies assessing patients with DML with or without mechanical symptoms treated with APM versus conservative therapy or APM vs sham surgery. * value reported as range of all patients.

Author	Type of study	Treatment	Clinical scores	Patients	Mean age years	Final followup months
Kirkley et al. 2008 (12)	RCT	APM + physical and pharmacological therapy vs physical and pharmacological therapy	SF-36, WOMAC	92 vs 86	58,6 vs 60,6	24
Herrlin et al. 2012 (15)	RCT	APM + physical therapy vs physical therapy	KOOS, VAS, LK, TAS	45 vs 47	54 vs56	60
Katz et al. 2013 (13)	RCT	APM + physical therapy vs physical therapy	SF-36, KOOS, WOMAC	174 vs 177	59 vs 57,8	12
Yim et al. 2013 (14)	RCT	APM + physical and medical therapy vs physical and medical therapy	VAS, LK, TAS	50 vs 52	54,9 vs 57,6	24
Sihvonen et al. 2013 (16)	RCT	APM vs sham surgery	WOMET, VAS, LK	70 vs 76	52 vs 52	12
Sihvonen et al. 2016 (10)	RCT	APM vs sham surgery	LK	70 vs 76	52 vs 52	12
Gauffin et al. 2017 (19)	RCT	APM vs physical therapy	EQ-5D, EG-VAS, KOOS	75 vs 75	45-54*	36
Sihvonen et al. 2018 (17)	RCT	APM vs sham surgery	WOMET, VAS, LK	70 vs 76	52 vs 52	24
Sihvonen et al. 2020 (18)	RCT	APM vs sham surgery	WOMET, VAS, LK	70 vs 76	52 vs 52	60

Abbreviations: KOOS, Knee Osteoarthritis and Injury Outcome Score; WOMAC, Western Ontario and Mc Master University; TLK, Tegner Lysholm Knee; LK, Lysholm Knee; TAS, Tegner Activity Scale; EQ-5D, EuroQol 5D; EQ-VAS, EuroQol visual analog scale; SF.36, Short Form-36; WOMET, Western Ontario Meniscal Evaluation Tool.

Discussion

Conservative therapy

At present, the treatment of DML in middle-aged patients remains problematic. Conservative therapy includes analgesics, non-steroidal anti-inflammatory drugs, glucocorticoid injections, physical therapy, weight loss, and avoiding specific movements that worsen symptoms (7). Both hyaluronic acid (HA) and platelet-rich plasma (PRP) injections are also valid alternatives for DML treatment. Mitev et al. (11) showed that PRP therapy of 126 patients with DML resulted in improvement 3 months after the PRP application, and the findings remained the same 6 months after the application.

HA injections has been shown to be successful also in the treatment of DML by inducing meniscal regeneration through inhibiting apoptosis, facilitating cell migration, and accelerating cell proliferation (1, 3). Berton et al. (1) conducted a prospective pilot study to determine the clinical efficacy of HA injections in 40 patients with DML and no knee OA. All clinical scores showed a statistically significant difference between baseline and 60 days follow-up. Meniscal healing, measured by a decrease in the T2 measurement on quantitative MRI, at 60 days follow-up was detected in the posterior horn of the medial meniscus in 39% of cases in both the red and red–white zone, and in 60% of cases in the white zone, while in the posterior horn of the lateral meniscus it was detected in 55% of cases in both the red and white zones, and in 65% of cases in the red–white zone. Similarly, Zorzi et al. (3) performed a recent RCT to investigate the effectiveness of intra-articular injection of HA plus conservative therapy compared to a control group who received

only conservative therapy in 50 patients with DML and no radiographic knee OA. They observed a significant reduction in VAS score, and meniscal lesion length and depth, measured by MRI, in the HA group compared to the control group.

Surgery

Each year, more than half a million patients undergo APM in the United States (18). However, there is disagreement about APM's benefit over conservative therapy or sham surgery for middle-aged patients affected by DML as shown by a recent systematic review of 10 RCTs (20).

APM vs physical therapy

DML in the presence of knee OA should be managed by conservative therapy rather than APM as indicated by international recommendations (21). In fact, according to ESSKA recommendations (5), APM should not be undertaken for DML with advanced radiographic knee OA (Kellgren–Lawrence (KL) grade II or more [22]). The reason is that, DML is mostly asymptomatic and knee pain is related to knee OA and not to DML (8). Kirkley et al. (12) conducted a single center RCT to evaluate the outcome of APM plus physical and pharmacological therapy (surgery group) versus physical and pharmacological therapy alone (control group) in patients with DML and moderate-to-severe knee OA (KL grade II–IV) at a follow-up of 3, 6, 12, 18, and 24 months. At 3 months, they observed that clinical scores in the surgery group had improved more than those in the control group that they attribuited it to a probable placebo effect, however, there were no significant differences between the groups during the subsequent visits concluding that APM for DML associated with knee OA give no added advantage to physical and pharmacological therapy. Similarly Katz et al. (13) conducted a multicenter RCT of 351 patients with DML and associated mild-to-moderate knee OA (KL grade 0–III) treated with APM plus physical therapy versus physical therapy only. They found no significant differences between the study groups in functional improvement 6 and 12 months after treatment.

Recent studies have demonstrated that even in the absence of radiographic signs of knee OA, there was no advantage of APM over conservative therapy of patients with DML (21). In deed, Yim et al. (14) published a RCT to determine the clinical results of APM (followed by physical and medical therapy) compared to conservative therapy (physical and medical therapy alone) in 102 patients with DML and no radiographic knee OA. The authors found no significant differences between the two groups in terms of reduction of knee pain, enhanced knee function, or increased patient satisfaction after 2 years of follow-up. Herrlin et al. (15) performed a RCT to assess the outcome of APM plus physical therapy compared to physical therapy alone when treating DML without radiographic knee OA. Both groups demonstrated substantial clinical improvements from baseline to 24 and 60 months follow-up, but, no group differences were found concluding that APM accompanied by physical therapy was not better than physical therapy alone. Thus, physical therapy should be recommended as initial treatment for this cohort of patients. These findings are supported by the ESSKA meniscal consensus (5) which recommends that in the treatment of patients with a symptomatic knee and DML without radiographic knee OA, APM should not be proposed as a first-line treatment, but after 3 months of persistent symptoms despite conservative therapy.

APM vs sham surgery

APM offer no further advantage for knee symptoms or function compared with sham surgery. Sihvonen et al. (16) conducted a multicenter, double-blind, RCT to determine the 12 months effectiveness of APM compared to sham surgery (APM was simulated) in 146 symptomatic patients with DML and no radiographic knee OA. At follow-up, no major clinical outcome differences between groups were found. Furthermore, no major differences in the number of patients needing additional knee surgery or severe adverse effects were found within the groups. The same authors found similar results at a followup of 2 and 5 years (17, 18).

APM for DML with mechanical symptoms

Recent studies (10, 17–19) questioned the validity of pre-operative mechanical symptoms (knee locking and catching) or unstable lesions as an indication for APM in patients with DML and no radiographic knee OA. Sihvonen et al. (10) in a double blinded RCT showed that APM has no additional advantage over sham surgery in relieving knee catching or occasional locking at 12 months follow-up. The same authors (17, 18) confirmed these results at 24 e 60 months follow-up. The same results were observed in another RCT by Gauffin et al. (19) who reported that patients with DML, no radiographic knee OA, and the presence of mechanical symptoms treated with APM had less benefit than patients without mechanical symptoms. These studies excluded significant major knee mechanical symptoms as locked knee and joint locking for more than 2 seconds more often than once a week. In these cases, patients could benefit from surgery even before 3 months period of conservative therapy as suggested by ESSKA consensus (5).

Prognostic factors of poor results after APM for DML

Numerous predictive factors of poor results after APM for DML have been identified in the current literature. In a prospective cohort study, Lizaur-Utrilla et al. (4) observed that the predictors of dissatisfaction among middle-aged patients treated with APM for DML with no knee OA were female sex, obesity, and lateral meniscal lesions. Vermesan et al. (23) reported that meniscal extrusion, bone marrow edema, duration of the clinical symptoms, obesity and a low pre-operative score were negative prognostic factors. A cohort analysis was undertaken by Kise et al. (24) to examine prognostic factors of pre-operative findings from MRI and arthroscopic assessment on patient-reported outcomes post APM. They found that complex meniscal lesions, larger extrusion, cartilage injuries, and larger meniscectomy were clinically significant prognostic factors for poorer outcomes 1 and 2 years post APM. Finally, in a recent retrospective study (25) of 160 patients aged between 50 and 70 years with diagnosis of DML and no or early stage knee OA (KL grade $\leq$2) who underwent APM, the authors found a statistically significant association between knee OA (KL grade 2), advanced chondral lesion (Outerbridge>2), lateral meniscectomy, age at surgery, female sex and malalignment and poor clinical outcome at final followup.

Conclusions

The findings of the present narrative review, suggest that the practice of APM should be proposed for patients suffering from knee pain and functional impairment due to DML with no radiographic knee OA and refractory to a 3 months period of conservative therapy or earlier in patients with major knee mechanical symptoms. Furthermore, surgeons should counsel patients that surgical treatment in the presence of negative prognostic factors is associated with poor clinical outcome.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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