Meniscus Implant and Allograft

Policy Number: 2020T0543M
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Instructions for Use

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Coverage Rationale

Meniscus Allograft Transplantation (MAT) with human cadaver tissue is proven and medically necessary for replacement of major meniscus loss due to trauma or previous meniscectomy when all of the following criteria are met:

- Individuals who are skeletally mature with documented closure of growth plates
- Disabling knee pain causing Functional Impairment that is refractory to conservative treatment
- Absence of more than half of the meniscus due to surgery or injury or has a tear that cannot be repaired
- Radiographic criteria established by a standing anteroposterior (AP) view demonstrates all of the following:
  - Normal alignment or correctable varus or valgus deformities
  - No osteophytes or marginal osteophytes
  - No irreparable articular cartilage defects
  - No significant joint space narrowing
- Normal knee biomechanics, or alignment and stability achieved concurrently with meniscal transplantation
- Minimal to absent degenerative changes in surrounding articular cartilage (Outerbridge Grade II or less)
- No evidence of active inflammatory arthritis or systemic arthritis

Collagen Meniscus Implants (CMI) are unproven and not medically necessary for treating or evaluating and managing meniscus injuries or tears due to insufficient evidence of efficacy.

Documentation Requirements

Benefit coverage for health services is determined by the member specific benefit plan document and applicable laws that may require coverage for a specific service. The documentation requirements outlined below are used to assess whether the member meets the clinical criteria for coverage but do not guarantee coverage of the service requested.

CPT Codes*	Required Clinical Information
Meniscus Implant and Allograft	
29868	Medical notes documenting all of the following: • Complete report(s) of diagnostic imaging (MRI, CT scan, x-rays and bone scan) Note: For pediatric age, indicate status of growth plates • Condition requiring procedure • Severity of pain and details of functional disability(ies) interfering with activities of daily living (preparing meals, dressing, driving, walking) • Physician's treatment plan including pre-op discussion • Pertinent physical examination of the relevant joint • Co-morbid medical condition(s) • Therapies tried and failed: ○ Orthotics ○ Medications/injections ○ Physical therapy ○ Surgical ○ Other pain management procedures • If the location is being requested as an inpatient stay, provide office notes to support at least one of the following: ○ Surgery is bilateral ○ Member has significant co-morbidities; include the list of comorbidities and current treatment ○ Member does not have appropriate resources to support post-operative care after an outpatient procedure; include the barriers to care as an outpatient • Degree of degenerative changes in surrounding – Outerbridge Grade • Why total knee replacement is not planned
Additional Clinical Information	
Note: Device information is not utilized in prior authorization determinations.	
Provide the following details on the device you intend to use during the procedure: • Specify which implant brand or manufacturer to be used: ○ Arthrex ○ BioMet ○ Conformis ○ Consensus ○ DePuy Synthes ○ DJO Surgical ○ MicroPort ○ Smith & Nephew ○ Stryker ○ Zimmer ○ Other (include name and reason for this selection) • Provide the fixation type from the following: ○ Cemented ○ Cemented with antibiotic impregnated ○ Non-cemented ○ Other (if another fixation type, then explain) ○ Cannot identify fixation prior to procedure	

**For code descriptions, see the Applicable Codes section.*

Definitions

Collagen Meniscal Implant (CMI): Resorbable and biocompatible Type I collagen matrix that was developed to restore the segmental loss of meniscal tissue in the knee. It consists of a porous cross-linked matrix scaffold that allows for the ingrowth of the body's own cells. (Hayes, 2019)

Functional or Physical Impairment: A functional or physical or physiological impairment causes deviation from the normal function of a tissue or organ. This results in a significantly limited, impaired, or delayed capacity to move, coordinate actions, or perform physical activities and is exhibited by difficulties in one or more of the following areas: physical and motor tasks; independent movement; performing basic life functions. (Who, 2011)

Meniscal Allograft Transplantation (MAT): Transplant of the meniscus of the knee, which separates the thigh bone (femur) from the lower leg bone (tibia). The worn or damaged meniscus is removed and is replaced with a new one from a donor. The meniscus to be transplanted is taken from a cadaver, and, as such, is known as an allograft. (Hayes, 2017)

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by the member specific benefit plan document and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CPT Code	Description
29868	Arthroscopy, knee, surgical; meniscal transplantation (includes arthrotomy for meniscal insertion), medial or lateral

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HCPCS Code	Description
G0428	Collagen meniscus implant procedure for filling meniscal defects (e.g., CMI, collagen scaffold, Menaflex)

Description of Services

Meniscal cartilage is an integral structural component of the human knee, functioning to absorb shocks and providing load sharing, joint stability, congruity, proprioception, and lubrication and nutrition of the cartilage surfaces. Allografts are grafts of tissues made available from a live person or a human cadaver. Allografts from cadavers avoid morbidity from harvesting tissue from a different site on the person requiring meniscus repair. The goal of meniscal allograft transplantation is to restore knee function and prevent further joint degeneration by replacing the damaged or destroyed meniscus with allograft tissue having similar properties as the damaged tissue.

The Collagen Meniscal Implant (CMI) is an implant derived from bovine collagen used to treat acute or chronic advanced meniscal loss or damage with the intent of relieving symptoms and preventing joint degeneration. The CMI is a flexible, sickle-shaped disc that mimics the shape of the native meniscus and is attached arthroscopically to native tissue with suture. The porous, collagen-glycosaminoglycan matrix of the CMI is meant to serve as a temporary template to support migration of the host's cells to the meniscal deficiency, restoring meniscal volume and function. (Hayes, 2019)

Clinical Evidence

Collagen Meniscus Implants (CMIs)

In a Hayes technology assessment (2019) the authors reported that studies for collagen meniscus implants commonly included small total enrollment, differences in duration of follow-up between groups, lack of blinding/masking, retrospective design; and less frequently included incomplete reporting, and in comparative studies, differences in group characteristics, duration of followup, and attrition. The overall quality of the evidence was rated as low to very low, due to poor quality studies, and inconsistent findings

In an ECRI custom product brief (2018) the authors reported the following: The evidence review provides too few data to draw conclusions about how well CMI works compared to other meniscus scaffolds or partial meniscectomy. Most of the studies have a high risk of bias because of small sample size and lack of control groups, randomization, and blinding. To assess CMI's comparative safety and effectiveness, RCTs would be needed that compare CMI and meniscectomy or other meniscus scaffolds and report patient-oriented outcomes (e.g., functional status, AEs, quality of life).

A poor-quality retrospective cohort study compared outcomes after Collagen Meniscus Implant (CMI) during concomitant ACL reconstruction with partial medial meniscectomy. (Bulgheroni et al. 2015) The results suggest that outcomes are not

significantly different between CMI and partial medial meniscectomy. Among patients with chronic pattern, patients treated with CMI had significantly lower postoperative pain than patients treated with partial medial meniscectomy; however, no difference was noted in patients with acute pattern or overall. Study limitations include small size, retrospective design with preoperative outcome scores obtained postoperatively, limited number of study centers, possible bias in selection of control group, and lack of blinding.

Grassi et al (2014) performed a systematic review to summarize and evaluate the clinical outcomes of the collagen meniscus implant (CMI) and its complication and failure rates. These data were then used to evaluate the results of the CMI at different follow-up time periods and investigate possible differences in the behavior of lateral and medial CMI. All studies evaluating medial or lateral CMI using the Lysholm score, visual analogue scale (VAS) for pain, Tegner activity scale and subjective or objective International Knee Documentation Committee (IKDC) scores were included in the systematic review. Eleven studies were included in the systematic review. The pooled number of patients involved in CMI surgery were 396. The Lysholm score and VAS for pain showed an improvement at six months up to ten years. No noticeable differences were present comparing short-term values of Lysholm score between medial and lateral CMI. The Tegner activity level reached its peak at 12 months after surgery and showed a progressive decrease through five and ten years post CMI implantation, however always remaining above the pre-operative level. Only a few knees were rated as "nearly abnormal" or "abnormal" at IKDC grading at all follow-up evaluations. The reviewers concluded the CMI could produce good and stable clinical results, particularly regarding knee function and pain, with low rates of complications and reoperations.

Harston et al (2012) examined collagen meniscus implant (CMI) effectiveness for improving patient function, symptoms, and activity level. Study methodologies, rehabilitation, and return to sports guidelines were also reviewed. A total of 11 studies with 520 subjects met inclusion criteria. The authors concluded that knee function, symptoms, and activity level generally improved following CMI use, but poor research report quality was common. They stated that additional well-designed long-term prospective studies are needed to better determine knee osteoarthrosis prevention efficacy and appropriate patient selection.

Zaffagnini et al. (2011) conducted a cohort study that included 33 nonconsecutive patients (men; mean age, 40 years) with meniscal injuries. Study participants received medial collagen meniscus implant (MCMI) or served as a control patient treated with partial medial meniscectomy (PMM). The choice of treatment was decided by the patient. All patients were clinically evaluated at time 0 and at 5 years and a minimum of 10 years after surgery by Lysholm, visual analog scale (VAS) for pain, objective International Knee Documentation Committee (IKDC) knee form, and Tegner activity level scores. The MCMI group, compared with the PMM one, showed significantly lower VAS for pain and higher objective IKDC, Teger index, and SF-36 for Physical Health Index scores. Radiographic evaluation showed significantly less medial joint space narrowing in the MCMI group than in the PMM group. The MRI evaluation of the MCMI patients revealed 11 cases of myxoid degeneration signal: 4 had a normal signal with reduced size, and 2 had no recognizable implant. The investigators concluded that pain, activity level, and radiological outcomes are significantly improved with use of the MCMI at a minimum 10-year follow-up compared with PMM alone. According to the investigators, randomized controlled trials on a larger population are necessary to confirm MCMI benefits at long term.

An assessment by the California Technology Assessment Forum (CTAF), (Tice, 2010) concluded that the collagen meniscus implant does not meet CTAF criteria. The CTAF assessment found that the pivotal randomized clinical trial (citing Rodkey et al, 2008) failed to demonstrate any improvement in pain or symptoms in either arm of the trial and the trial has substantial risk for selection bias, confounding, and reporting bias because of the large number of patients lost to follow-up after randomization and the lack of blinding for subjective outcomes. In addition, no data on osteoarthritis were presented. The CTAF assessment concluded that the trial "presents evidence that the collagen meniscus implant offers no important clinical benefits, requires longer and more intensive post-operative rehabilitation, and some uncertainty remains about the potential for long-term harm from the device."

Bulgheroni et al. (2010) investigated the clinical outcomes and any progression of knee osteoarthritis in 34 patients who underwent arthroscopic placement of a collagen meniscus implant. Lysholm and Tegner activity scores at 2 and 5 years after surgery improved significantly compared to the preoperative score. These patients showed good to excellent clinical results after 5 years from a CMI placement. In most of cases, the CMI-new tissue complex had a slight reduction in size, compared to a normal medial meniscus, but the new tissue had no apparent negative effects. According to the investigators, 5 years after the implant, the regenerated tissue still was not completely similar to a normal meniscus. This study is limited by a small sample size and lack of a control group.

A technology assessment conducted by Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). (2010) concluded that the collagen meniscal implant for irreparable medical meniscus injury did not meet technology assessment criteria. The published evidence did not support improvement in health outcomes or that clinical improvement was attainable outside of the investigational setting. Although promising, long-term data supporting safety, efficacy and improved clinical outcomes, including prevention of osteoarthritis, are not yet available to support widespread use of this bioactive scaffold for meniscal regeneration.

Rodkey et al. (2008) conducted a randomized controlled trial that included 311 patients with an irreparable injury of the medial meniscus or a previous partial medial meniscectomy. There were two study arms, one consisting of 157 patients who had had no prior surgery on the involved meniscus (the acute arm of the study) and one consisting of 154 patients who had had one, two, or three prior meniscal surgical procedures (the chronic arm). Patients were randomized either to receive the collagen meniscus implant (CMI) or to serve as a control subject treated with a partial meniscectomy only. Patients underwent frequent clinical follow-up examinations over two years and completed validated outcomes questionnaires over seven years. Patients who received the collagen meniscus implant followed a different post-op protocol, receiving a specific rehabilitation protocol and the requirement of a second-look arthroscopy with biopsy one year after implant placement. In the acute group, seventy-five patients received a collagen meniscus implant and eighty-two were controls. In the chronic group, eighty-five patients received the implant and sixty-nine were controls. The mean duration of follow-up was fifty-nine months. The 141 repeat arthroscopies done at one year showed that the collagen meniscus implants had resulted in significantly increased meniscal tissue compared with that seen after the original index partial meniscectomy. The implant supported meniscus-like matrix production and integration as it was assimilated and resorbed. In the chronic group, the patients who had received an implant regained significantly more of their lost activity than did the controls and they underwent significantly fewer non-protocol re-operations. No differences were detected between the two treatment groups in the acute arm of the study. The investigators concluded that new biomechanically competent meniscus-like tissue forms after placement of a collagen meniscus implant, and use of the implant appears safe. The collagen meniscus implant supports new tissue ingrowth that appears to be adequate to enhance meniscal function as evidenced by improved clinical outcomes in patients with a chronic meniscal injury. According to the investigators, the implant was not found to have any benefit for patients with an acute injury.

The data from the Rodkey study was used by the U.S. Food and Drug Administration (FDA) in the 510(k) application process for the Menaflex collagen meniscus implant. An FDA executive summary of the Rodkey data indicated that patients who received the collagen meniscus implant followed a different post-op protocol than the control group and control patients were not required to undergo a planned second-look arthroscopy since it was assumed that there was no tissue regrowth in these patients. The FDA also indicated that more meniscal tissue was removed from the collagen meniscus implant patients than in the control patients. The FDA noted that the re-look arthroscopy results for collagen meniscus implant group showed that 16% of evaluated devices were not firmly attached to the host rim and 18% of knee compartments were determined to be worse than during the operative procedure at the time of the re-look arthroscopic procedure. According to the FDA summary, the Tegner Index is meant to complement other functional scores (Lysholm knee score) for patients with ligamentous injuries, however, the investigators reported the Tegner Index in isolation and there was no pre-specified hypothesis for its use in the study design, thus, it is unclear how this endpoint should be interpreted given that there is no defined clinical significance for the Tegner Score when used in isolation. In addition, the FDA executive summary stated that at the 3 to 7 year annual follow-up time points, there is approximately 50% of the data available. It is not clear how the missing data has impacted the presentation of the safety and effectiveness endpoints at time-points later than 24 months. The primary endpoint was a 24-month endpoint.

Meniscus Allograft Transplantation

Elattar et al. (2011) conducted a meta-analysis of published trials reporting outcomes of meniscal allograft transplantation to establish its safety and reproducibility. The outcomes of 678 medial and 458 lateral grafts in 613 male, 265 female and 190 non-defined patients with a mean age of 34.8 years were included in the meta-analysis. According to the authors, all studies reported a continuously satisfactory outcome with restoration of working capacity in these active patients. The authors stated that meniscal allograft transplantation can be considered as safe and reliable for the treatment of refractory post-meniscectomy symptoms in selected patients.

Hergan et al. (2011) performed a systematic review evaluating meniscal allograft transplantation (MAT). Included in the review were 14 studies with at least 2 years' follow-up, studies with validated outcome measures, and studies in which the allograft meniscal horns were secured with bony fixation. Thirteen of the articles provided Level IV evidence, and one article (Stollsteimer et al. 2000) provided Level III evidence. The authors concluded that good early and midterm results of cryopreserved or fresh-frozen, nonirradiated MAT can be achieved in a relatively young patient with only mild chondromalacia

(lower than Outerbridge grade 3) who is not overweight and has a stable, mechanically aligned lower extremity, if the allograft is sized radiographically by use of anteroposterior and lateral films and the allograft meniscal horns have bony attachments and are fixed by bony techniques. Similar results can be expected if the transplant is performed alone or with a concomitant cartilage repair procedure; however, significant cartilage defects (Outerbridge grade 2 or greater) on both the femoral and tibial sides in the same compartment requiring autologous cartilage implantation result in a high failure rate. Good outcomes of MAT can be expected when performing a concomitant ligament reconstruction or malalignment procedure on the knee, unless greater than 3 concomitant procedures are performed. There is no significant difference in outcome between medial and lateral MAT. According to the authors, despite a growing body of knowledge on the topic, there remains a lack of consensus regarding optimal allograft sizing technique, allograft fixation techniques, tissue processing, indications, and long-term efficacy. The authors stated that a prospective, randomized trial comparing MAT in a meniscectomized knee with a control group is needed to determine the best technique and patient selection criteria.

Professional Societies

American Academy of Orthopedic Surgeons

The American Academy of Orthopedic Surgeons published an information statement regarding the use of musculoskeletal tissue allografts (AAOS, 2011). The AAOS supports the following:

- The use of musculoskeletal allograft as a therapeutic alternative to autograft use for appropriate patients. Allograft tissues should be acquired from facilities that demonstrate compliance, use well-accepted banking methodology and good tissue practices. The AAOS urges all tissue banks to follow rigorous national guidelines and standards.
- The AAOS strongly favors on-site inspection and recommends the use of tissue banks by the American Association of Tissue Banks (AATB). The AAOS supports informed consent, for both the donor family and the recipient of human tissue, in accordance with local, state and federal laws and regulations.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

Transplantation of meniscal allografts is a surgical procedure and, as such, is not subject to regulation by the FDA. However, the FDA does regulate certain aspects of tissue banking, and tissues are subject to FDA registration and requirements for good tissue practices and infectious disease screening and testing, as well as to the good manufacturing practice requirements applicable to drugs and devices. According to current rules, FDA premarket review or marketing approval is not required for minimally processed tissues transplanted from one person to another for their normal structural functions; these criteria apply to meniscal allografts. See the following website for more information: http://www.fda.gov/BiologicsBloodVaccines/TissueTissueProducts/default.htm. (Accessed June 4, 2020)

Collagen meniscus implants, also known as collagen scaffold, or Menaflex, are bioresorbable, primarily bovine type 1 collagen. This product was designed as a tissue-engineered scaffold to support the generation of new meniscus-like tissue. The Collagen Meniscal Implant (CMI), the ReGen Collagen Scaffold (CS), and the Menaflex device are different names for the same device. https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm?ID=K170364.

Stryker® acquired Ivy Sport Medicine (developer of the Menaflex collagen meniscus implant) in 2016.

Centers for Medicare and Medicaid Services (CMS)

Medicare does not have a National Coverage Determination (NCD) specifically for meniscus allograft transplantation (MAT). Local Coverage Determinations (LCDs) exist for CPT code 29868. See the LCDs for Noncovered Services. Medicare does not have an NCD for Collagen Meniscus Implants (CMI). Local Coverage Determinations (LCDs) do not exist.
(Accessed June 10, 2020)

References

American Academy of Orthopaedic Surgeons (AAOS). Use of Musculoskeletal Tissue Allografts. 1991. Revised 2011.

Blue Cross and Blue Shield Association Technology Evaluation Center (TEC). Collagen Meniscal Implant TEC Assessment. (2010).

Bulgheroni E, Grassi A, Bulgheroni P, et al. Long-term outcomes of medial CMI implant versus partial medial meniscectomy in patients with concomitant ACL reconstruction. Knee Surg Sports Traumatol Arthrosc. 2015;23(11):3221-3227.

Bulgheroni P, Murena L, Ratti C, et al. Follow-up of Collagen Meniscus Implant patients: clinical, radiological, and Magnetic Resonance imaging results at 5 years. Knee. 2010 Jun; 17(3):224-9.

ECRI Institute. Custom Product Brief. Collagen Meniscus Implant XL (Stryker Corp.) for Treating Medial Meniscus Injuries. December 2018.

Elattar M, Dhollander A, Verdonk R, et al. Twenty-six years of meniscal allograft transplantation: is it still experimental? A meta-analysis of 44 trials. Knee Surg Sports Traumatol Arthrosc. 2011 Feb;19(2):147-57.

Grassi A, Zaffagnini S, Marcheggiani, et al. Clinical outcomes and complications of a collagen meniscus implant: a systematic review. Int Orthop. 2014 Sep;38(9):1945-53.

Harston A, Nyland J, Brand E, et al. Collagen meniscus implantation: A systematic review including rehabilitation and return to sports activity. Knee Surg Sports Traumatol Arthrosc. 2012;20(1):135-146.

Hayes, Inc. Health Technology Brief. Collagen Meniscus Implant (CMI) (Menaflex; Ivy Sports Medicine LLC) for Meniscal Repair. Updated January 2019. Archived March 2020.

Hayes, Inc. Medical Technology Directory. Meniscal allograft transplantation. Archived January 2017.

Hergan D, Thut D, Sherman O, et al. Meniscal allograft transplantation. Arthroscopy. 2011 Jan;27 (1):101-12.

Rosso F, Bisicchia S, Bonasia DE, et al. Meniscal allograft transplantation: a systematic review. Am J Sports Med. Apr 2015.

Tice J. Collagen meniscus implant for repair of medial meniscus injury of the knee. California Technology Assessment Forum. June, 2010.

World Health Organization and World Bank. (WHO) World report on disability. 2011.

Zaffagnini S, Marcheggiani Muccioli GM, et al. Prospective long-term outcomes of the medial collagen meniscus implant versus partial medial meniscectomy: a minimum 10-year follow-up study. Am J Sports Med. 2011 May;39 (5):977-85.

Policy History/Revision Information

Date	Summary of Changes
08/01/2020	**Template Update** • Reformatted policy; transferred content to new template **Supporting Information** • Updated *Clinical Evidence*, *FDA*, *CMS*, and *References* sections to reflect the most current information • Archived previous policy version 2019T0543L

Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the member specific benefit plan document must be referenced as the terms of the member specific benefit plan may differ from the standard plan. In the event of a conflict, the member specific benefit plan document governs. Before using this policy, please check the member specific benefit plan document and any applicable federal or state mandates. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

This Medical Policy may also be applied to Medicare Advantage plans in certain instances. In the absence of a Medicare National Coverage Determination (NCD), Local Coverage Determination (LCD), or other Medicare coverage guidance, CMS allows a Medicare Advantage Organization (MAO) to create its own coverage determinations, using objective evidence-based rationale relying on authoritative evidence (Medicare IOM Pub. No. 100-16, Ch. 4, §90.5).

UnitedHealthcare may also use tools developed by third parties, such as the MCG™ Care Guidelines, to assist us in administering health benefits. UnitedHealthcare Medical Policies are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.