

MACI with DFO — Pre-Operative Information

About Your Injury

Articular cartilage is the smooth, white tissue that covers the ends of your bones inside the knee joint. It allows your bones to glide against each other with almost no friction. When cartilage is healthy, it does this silently. When damaged, it becomes one of the most challenging problems in orthopedic surgery—because **cartilage has essentially no ability to heal itself**.

Unlike bone or muscle, cartilage has **no blood supply and no nerves running through it**. Without blood flow, damaged cells cannot migrate to the injured area and rebuild tissue. A cartilage injury left alone does not get better—it gets larger. We use a simple analogy: think of your joint surface as a road. A focal cartilage defect is a pothole. Our goal with surgery is to fill that pothole before the road deteriorates further.

Your imaging shows a **cartilage defect on the femoral condyle along with lower limb malalignment**. When the leg has **valgus alignment** — sometimes called knock-kneed — (the weight-bearing line passes toward the lateral side of your knee), extra load is directed toward the damaged area. A **distal femoral osteotomy (DFO)** corrects this by cutting and repositioning the femur to shift weight away from the damaged area and onto the healthier side of the joint, giving your graft the protected environment it needs to heal.

Two separate structures must heal simultaneously: the **MACI cartilage graft** (12–18 months for full maturation) and the **femoral osteotomy bone cut** (typically confirmed by 6-week X-ray). Both healing timelines drive your recovery protocol.

[Learn more at merrittsurgery.com](http://merrittsurgery.com) or [youtube.com @merrittsurgery](https://www.youtube.com/@merrittsurgery)

About Your Surgery

MACI (Matrix-Assisted Chondrocyte Implantation) is an FDA-approved, two-stage procedure:

Stage 1 (Biopsy): A small biopsy of healthy cartilage from an area of your knee that doesn't bear weight is taken during an arthroscopic procedure.

Stage 2 (Implantation): Over 4–6 weeks, your biopsy cells are expanded in the laboratory to create millions of cells. In the second surgery (your upcoming procedure), the cultured cells are implanted into your cartilage defect using fibrin glue.

The second stage of the operation is generally done open, but can occasionally be done arthroscopically.

This is a very meticulous surgery that requires significant precision and treatment and placement of the new cartilage cells into the cartilage defect. Over time, the knee is protected and the cartilage is allowed to grow into the bone. Since this is your own cells, the goal is to recreate the normal cartilage that was in your knee before the injury.

Healing Occurs in Four Stages:

Week 1–2: Integration of the graft.

Week 2–12: Cell differentiation and matrix formation.

Month 3–12: Tissue maturation and integration.

Month 12+: Ongoing maturation and remodeling (up to 24 months).

85% of MACI implants are still intact at 5 years, making this one of the most successful cartilage restoration procedures available.

The distal femoral osteotomy (DFO) is performed at the same time as the MACI implantation.

Dr Merritt used CT scan + NewClip 3D-printed custom cutting guide allow us to plan the exact amount of bone to remove and angle of correction. This maximizes precision and reduces operative time.

Surgery typically takes about 2 hours. This is an outpatient surgery generally performed at Valley Medical Center. You will go home the same day.

Risks: infection, blood clots, numbness, stiffness, delayed bone healing or non-union (especially in smokers), overcorrection/undercorrection, hardware irritation, continued pain. Smoking significantly impairs bone healing — **you must stop smoking at least two weeks before surgery.**

What happens on the day of surgery: A couple of days before surgery, the nursing staff will call you to confirm your check-in time and when to stop eating and drinking. On the day of surgery, check in at the front desk at your assigned time. You will go to the pre-op area with your family where our nurses will help you get changed, start an IV, and review your health history. You will meet with me to review the plan, and the anesthesia team will explain their approach. When the operating room is ready, you will walk back with a nurse. After anesthesia is given, you will not remember anything until the recovery room.

While you are in surgery, your family can pick up your post-operative medications at the pharmacy next to the surgery center. If you are under 18, one family member must stay at the surgery center during the entire surgery. In the recovery room, you will be monitored until you are awake, have some crackers and juice, and be made comfortable. Once ready, you will change into your clothes and be wheeled to your car. **You will need someone to drive you home and stay with you for the first 24 hours.**

After Surgery — What to Expect

After surgery, pain, swelling, and limited motion are expected and normal. You will be in a **hinged knee brace locked straight at full extension (0°)** and **on crutches**. The brace will be locked for all mobilization activity and during sleep for the first 4 weeks.

Two structures are healing at the same time: the **MACI cartilage graft** and the **femoral osteotomy bone cut**. The osteotomy drives your early weight-bearing restrictions. **Weight bearing will not advance until a 6-week X-ray confirms the bone is healing properly.**

Physical therapy should start within the first week, 2 times per week. Range of motion (ROM) will be progressed more aggressively than isolated MACI procedures to prevent stiffness. Aggressive ROM targets are used because combined DFO/MACI procedures have higher stiffness risk (arthrofibrosis). Expected ROM milestones: **90° by Week 1, 105° by Week 2, 115° by Week 3, 125° by Week 4.**

An unloading knee brace is often introduced at Weeks 6–8 to protect the graft compartment as weight-bearing increases.

Timeframe	What to Expect
Week 0–1	Non-weight bearing (NWB). Brace locked at 0° for weight bearing and sleep. Aggressive ROM targets: 90° by Week 1. Start NMES to quadriceps, quad sets, straight-leg raises, heel slides, ankle pumps, and patellar mobilization from Day 1.
Weeks 1–5	Toe-touch weight bearing (TTWB)—foot contacts floor for balance only, ~20–30 lbs. Brace locked during weight bearing. ROM targets: 105° by Week 2, 115° by Week 3, 125° by Week 4. Active knee extension exercises (90°←40° arc, no resistance).
Week 6	Six-week X-ray determines if the femoral osteotomy bone has healed. If confirmed: begin weight bearing as tolerated (WBAT) and progress to full WB. If not confirmed: continue TTWB until follow-up imaging clears advancement.
Weeks 6–9	Transition to full weight bearing (FWB): bilateral crutches → single crutch → no crutch by Weeks 8–9 (after X-ray clearance). Unloading knee brace introduced. Recumbent bike and pool therapy begin. ROM progresses to 125–135° by Week 8.
Weeks 10–12	ROM reaches full range (130°+). Mini-squats (0–45° arc) begin. Leg press and step-ups introduced. Resisted OKC extension (90°←40°). Progress walking tolerance and balance work.
Months 3–5	Progressive strengthening and functional loading. Full ROM unrestricted. Loaded deep flexion (>90°) begins after Month 5. Low-impact conditioning (cycling, swimming, elliptical). No impact activities yet.
Months 5–6	Walking tolerance increases. Walking-to-jogging program begins under PT supervision. Low-impact running on flat surfaces.
Months 9–12	Continued running program (walk-jog intervals progressing to continuous running). Plyometrics introduced at Month 12 only. Sport-specific skill training at progressive intensity.
12–18 months	Return to cutting/pivoting/impact sports after meeting all strength and functional criteria AND surgeon clearance. MRI typically done at 12-month visit. Full MACI maturation occurs by 18 months.

Driving: Right leg 6–8 weeks, left leg 4–6 weeks, and you must be off narcotic pain medications before driving.

Preparing for Surgery

Pre-surgical physical therapy (prehab): The stronger you come into surgery, the stronger you come out of surgery. Good quad strength and ROM of the knee ensures an easier recovery.

Nutrition: A good diet with increased protein and collagen supplementation helps speed your recovery and prevent muscle weakness after surgery. Vitamin C can help with inflammation and stiffness. Start these before surgery and continue through your recovery.

Ice Machine — My #1 Recovery Recommendation

I highly recommend purchasing an ice machine to help your recovery. An ice machine is the single best investment you can make — it allows for continuous icing without the risk of frostbite and is far easier than using ice bags or gel pads. Our clinic staff can fit you for one before surgery and show you how to get the most out of it. Stock up on bags of ice — the machine can go through a bag a day when used regularly.

Prepare your home: Remove throw rugs or obstacles that might catch a crutch and cause a fall. Make sure you have clean sheets and comfortable clothes ready. Stock the refrigerator with healthy food and buy bags of ice for the ice machine.

Handicap placard: You will be given a handicap parking pass application at your clinic visit. Get this at a DMV office before your surgery so you do not have to deal with it while recovering.

Day-of-Surgery Checklist

- ☐ Verify your check-in time and follow instructions on when to stop eating and drinking
- ☐ Schedule Physical Therapy for 5–7 days after surgery (do this before surgery)
- ☐ Bring your brace — you will be fitted at your pre-operative visit
- ☐ Wear comfortable clothes that fit over a brace (sweatpants work well)
- ☐ No perfume or lotion on your skin
- ☐ Remove or leave jewelry at home
- ☐ Have the ice machine and bags of ice ready at home for when you return

Contact Information

Questions about your surgery:

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