Case Study 4: The Osteoarthritic Knee

59-year-old Caucasian female correction officer works in a prison. She climbs stairs through the day and has a ten year progressive worsening of knee pain and functional disability. Patient had MRI demonstrating advanced arthropathy with stage IV chondrosis and tricompartmental osteoarthritis. She was offered a total joint arthroplasty. She is 59 and wants to be able to retire from the prison system before she considers a total joint arthroplasty. She also wants to avoid the significant time off work that a total joint arthroplasty would require. She is looking for non-operative options for management of pain and functional disability. MRI of the knee demonstrates full thickness cartilage loss, a peripheral meniscus extrusion with tear of the medial meniscus and advanced degeneration of the posterior horn of the medial meniscus. Bone marrow edema was present under the cartilage defects under the medial femoral condyle on T2 imaging not shown.

A decision was made to utilize a specific type of stem cell that was placed intraosseous within the medial femoral condyle under fluoroscopic guidance. In addition, a proprietary extracellular matrix scaffolding graft was utilized within the meniscotibial ligaments and placed around the articular capsule and medial meniscus in conjunction with injection of other biological interventions, growth factors, and a specific type of PRP containing alpha-2-macroglobulin. This was all done as a same-day procedure in a patient who was becoming functionally impaired and hardly able to get around work. Three months postprocedure. The patient reports no significant pain in her knee. She only has occasional discomfort and is able to negotiate stairs and work in her usual and customary work duties without significant difficulties. She still has some residual pain when performing certain physical activities, but overall she is markedly better. The patient may require occasional intervention but it is felt we can delay total joint arthroplasty and keep the patient comfortable until she retires.

There are huge implications in this case. She is 59 years of age. When you have a knee replacement, you want to have only one. Since total joint arthroplasty is not a permanent correction and has a specific life expectancy to the procedure, a revision surgery would more than likely be something. This patient would be facing in the future. Revision surgeries are more difficult and can have more associated morbidity. Having an option for nonoperative management that can manage the arthritic disease and maintain comfort and reduce functional disability could potentially delay this patient from having an early knee replacement surgery. The patient has been able to continue her appointment and was unlikely will be able to continue to do so with minimal interventions allowing her to retire with full benefits.

When we were utilizing simple stem cell injection procedures, we noted inconsistencies in clinical outcomes in patients with stage IV osteoarthritis such as this patient demonstrated. We explored numerous stem cell interventions and there was always an unacceptable percentage of patients who did not respond or partially responded. For years we worked on developing protocols to manage more significant arthritic disease in the knee. We were eventually able to develop a tissue engineering

approach utilizing proprietary techniques that incorporate extracellular matrix scaffolding grafts, various biological interventions including cellular therapies, growth factors, and a specific isolation of autologous plasma proteins. Once we had this specific biologic intervention.

We also had to learn how to use it. We have finally developed a protocol that we believe has consistently made a significant difference in patients with stage IV osteoarthritis. Now that we have advanced this technique to this point, we plan to begin conducting multicenter clinical trials in 2016. This has taken painstaking efforts and a collaboration with multiple physicians in basic research scientist to accomplish what we have today.