KEEPING UP WITH CHANGES IN ORTHOPEDIC SURGERY:

PLATELET RICH PLASMA (PRP) & STEM CELLS

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The science of Orthopedic Surgery and the treatment of early osteoarthritis as well as soft tissue injuries is rapidly changing. The goals and trend today remains how to preserve and rejuvenate articular cartilage to prevent or delay the need for total joint replacement. Articular cartilage is the smooth, glisten, white surface at the ends of bones that allows motion in joints. Articular cartilage has no blood supply and therefore relies on joint fluid for its nutrients. Arthritis is the roughening or wear of this cartilage surface which is caused by trauma, overuse, joint instability and some metabolic conditions.

Orthobiologics in Use:
The use of "Platelet Rich Plasma" **PRP** and **"**Mesenchymal Stem Cells" **MSC's** is now more widely accepted as an alternative to early surgery and grown in popularity for the treatment of early osteoarthritis especially in the knee and hip joint and in certain difficult soft tissue over use syndromes such as tennis elbow, Achilles tendonitis, and hamstring tears.

While acceptance in the orthopedic community has grown rapidly, insurance carriers and especially Workers Compensation Carriers have been reluctant to accept and authorize the use of these new "biologic" modalities. Research has exploded over the past several years looking into the role of these agents and their make-up, usage, actions and advantages and disadvantages of each.

PRP - Platelet Rich Plasma:
Platelets are a part of the white blood cells and are most often thought of as helping in clotting and found in the serum of blood. Platelets contain several protein growth factors in high concentrations that can turn these platelet cells into polymorphic cells that can form muscle, cartilage or bone. We have yet to discover the exact molecule responsible for this growth factor and ability to morph into different tissue.

The platelets are easily harvested in an office setting. The physician draws blood from the patient and the spins the blood in a centrifuge to separate the red cells from the white cells. For intra-articular injections, the white cells are then filtered to separate the white cells from the platelets. The platelets are then easily injected in the knee shoulder or hip.

Following the injection, the patient may leave the office. Use of anti- inflammatory agents such as aspirin, Motrin or Naprosyn, are prohibited in the first 2 weeks; and we recommend no vigorous exercise or stress on the joint for 2 weeks. The patient can get a flair reaction with swelling and pain for several days, which is managed by ice and Tylenol, but this is not common. Usually the patient can return to work within 48 hours, and heavy work within 1-2 weeks.

Most patients begin to feel improvement at about 6 weeks and continued improvement over the next 6-12 months. The cost of this treatment in my office is approximately $1500.

MSC Mesenchymal Stem Cells:

Mesenchymal Stem Cells are another type of cell that has the potential to transform into a variety of cell types including bone, muscle and cartilage. The two most common sources for the cells are adipose tissue (fat) and bone marrow.

In our center we have found adipose harvesting easiest and is an abundant source of MSC cells. We use a plastic surgeon to harvest a patient's adipose (fat) cells in an operating room setting, much like doing a mini lipo-suction procedure.

The patient's own harvested fat cells are then centrifuged to obtain the "buffy layer" of stem cells, filtered and then injected into the affected joint by the orthopedic specialist.

Stem cells from Bone Marrow are harvested much like a bone marrow transplant. In a sterile operating room environment using a small incision and a special needle like tool the bone marrow is harvested from the patient. Again, it is centrifuged, filtered and injected into the patient's joint. The same post- operative precautions are used.

Because of the more invasive nature of these two methods, there are possible risks of complications including infection at the donor sites. However, using the patient's own cells creates a safe acceptance rate and no rejection of the cells because the procedures are using the patient's own cells.

Viscoelastic Supplementation:

Hyaluronic acid is considered the "building block" to nourish the cartilage surface. Natural and synthetic Hyaluronic Acid (such as Synvisc, Supartz, Hylgan et. al.) is given to patients as an injection into the joints to try rejuvenating and repair the articular surface.

Recently most insurance companies, including Medicare and Worker's Compensation have stopped authorizing this procedure which typically cost $750-$1000 for the substrate and the physician office fee for between 1 and 5 injections.

Chorionic Stem Cells

Many companies are marketing commercially harvested chorionic stem cells taken from placental tissue. There is VERY little research to support the use of this modality and is not approved as yet by the FDA. Since the source of the cells and the process used to harvest and

preserve these cells is not well defined, I have been reticent to utilize this method until more research is available.

The Research

The number of research and peer reviewed articles has gone from 1 in 2001 to 1500 studies in 2018. The research is trying to uncover the exact protein that promotes the polymorphic potential of these cells. Many studies are now underway to compare and contrast different methods and even the use of combination of both MSC's and HA.

The Journal of Arthroscopy in 2017 published an article comparing HA (Hyaluronic Acid) to PRP and found no difference at 6 mos. but significant improvement at 1-year post injection in the PRP group.

The finding of the research as let to the conclusions that use of Orthobiologics are:

- Safe (there have been no serious complications in all the studied)
- Most effective in patients with normal BMI (body mass index; under 50 yo; with early stage osteoarthritis
- The Management of the patient's expectations remains important.

Orthobiologics in the WC Setting

Approval through UR is spotty at best. There is no mention of Orthobiologics PRP or Stem Cells in MTUS and ACOEM guidelines. ODG does site articles and recommends the use of PRP in patients with symptomatic early to moderate osteoarthritis who have failed a conservative course of treatment including NSAIDs; PT; and other modalities.

Conclusions:

The use of PRP and/or stem cell preparations are extremely promising, cost effective and safe.

Certainly, more research is needed to refine techniques and help isolate the active growth factors in the platelets and stem cells which can increase the ability of these cells to morph into bone, cartilage, muscle and hopefully nerves. Research is needed to explore the use of systemic stem cells in the treatment of autoimmune type diseases and even CRPS.

We as an industry must increase monitoring of the supposed "Stem Cell Centers" who want to ride the wave of popularity to use them only as a profit center, at inflated prices. As a specialty we must instead incorporate fact- based science to provide quality and expert treatment protocols to achieve success in returning function to injured workers.