OSTEOARTHRITIS – AN OVERVIEW
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OSTEOARTHRITIS: DEFINITION
Osteoarthritis (OA) is defined as the degradation of the joint articular surface cartilage associated with, but not caused by, aging. It is caused by the enzymatic degradation of the cartilage substrate. This degradation results in thinning and “wearing away” of the articular cartilage surface of the joints. Although there are over 100 different types of arthritis, OA is by far the most common. Osteoarthritis is also known as degenerative arthritis or “wear-and-tear arthritis.” Over eighty-five percent of the population over 65 years old has some evidence of osteoarthritis present.

CLINICAL PRESENTATION OF OSTEOARTHRITIS
Osteoarthritis has a fairly typical clinical presentation. It is associated with stiffness of the joints, particularly in the morning. Excessive use can cause soreness and joint swelling. The progression of the disease is slow and insidious. Patients often notice the onset of initial symptoms after some type of an injury. Osteoarthritis characteristically affects certain joints of the body and spares others. The joints commonly affected include the great toe metatarsophalangeal joint (joint at the base of the big toe), midfoot joints, knee, hip, lumbar and cervical spine, the acromioclavicular joint (AC joint) of the shoulder, the wrist, the basal joint of the thumb (joint at the base of the thumb), and the distal interphalangeal joints of the fingers (the joint closest to the fingernail). Joints usually spared by OA include the hindfoot, lesser toe joints, shoulder, elbow, and metacarpophalangeal joints (the knuckle joints) of the hands. There are no positive laboratory tests in patients with OA. Blood tests positive in other types of arthritis such as rheumatoid arthritis or the arthritis associated with Lupus are normal in patients with OA.

X-RAY CHANGES
Initially, x-rays of osteoarthritis can be normal in the early stages of the disease. Subtle early radiographic signs include a sharpening of the edges of the joint, which are usually rounded on x-ray appearance. This is particularly true in the knee. As OA progresses in severity, bone spurs (osteoophytes) are formed and can be easily visualized on the x-ray. Finally, as the articular cartilage begins to thin and wear, the space of the joint itself will be narrowed. This can be particularly seen on weight bearing x-rays. Eventually, when complete loss of the articular cartilage has occurred, the x-ray will show a “bone-to-bone” appearance, and the joint
space will be completely obliterated. Other x-ray changes include cysts, which can form beneath the bony surface of the joint. Sclerosis, or dense bone, can form just beneath the cartilage surface and can be seen radiographically as a dense white line.

TREATMENT OF OSTEOARTHRITIS

GENERAL
There is no cure for osteoarthritis, nor has any treatment been devised that has proven to slow or change the natural progression of the disease.

REST
If an arthritic joint becomes acutely inflamed, swollen and sore, a period of rest may be required. This period should be kept as short as possible, as inactivity itself is counterproductive in treating osteoarthritis and can lead to permanent joint stiffness.

EXERCISE
Exercise in moderation can be beneficial to patients with osteoarthritis. The concept of “thresholds” needs to be understood. If the level of exercise is below a certain threshold (if a patient exercises too little), then joint stiffness might be a major complaint. If the level of exercise is above a given threshold in an individual patient, then the major complaint may well be joint swelling and soreness. Each patient needs to discover, on a trial and error basis, what their threshold boundaries might be so that an individual patient is neither performing too little nor too much exercise.

There are several exercises that are well tolerated in a patient with OA. Walking, particularly on flat ground, is probably the best. The use of a treadmill is also an excellent exercise that should be tried, though it occasionally can be a problem for a patient with low back problems. Cross-country ski machines are often well tolerated. Very light resistive weights (staying away from maximum loads) can be helpful, but should be done under the guidance of a therapist or a trainer. Weights lifted incorrectly can aggravate an arthritic condition. Swimming is often helpful, as it is a non-weight bearing activity. However, some patients with cervical spine disease cannot tolerate the head turning of “freestyle” swimming. Water aerobics is a very well-tolerated exercise. Low-impact land aerobics can also be well tolerated. Bicycling or use of an elliptical trainer is usually well tolerated except in patients who have severe arthritis under the patella (kneecap).

Exercise poorly tolerated in patients with arthritis includes activities which excessively stress the knees, such as stair climbing, squatting, and hill climbing. Thus, stair climbing machines put excessive loads on the knee and are usually poorly tolerated. Similarly, heavy weight lifting often stresses the joint excessively and produces soreness. High-impact aerobics and running often provide excessive stress in a patient with osteoarthritis. Sports requiring high torque or twisting to arthritic joints are poorly tolerated.

HEAT AND COLD THERAPY
In theory, ice is most beneficial for an inflamed, swollen, arthritic joint. Ice or cold treatments will inhibit the inflammatory reaction, thus reducing swelling and pain. Ice is usually administered in 15 to 20 minute intervals, on an as-needed basis.

Despite the theoretical advantages of ice, many patients with arthritis actually feel better after heat treatments. This can be administered in a variety of ways, including a hot shower, a hot bath, immersion in a hot tub, exercises performed in a “hot pool”, or by the administration of heat via physical therapy modalities such as ultrasound treatments.
In the final analysis of the heat-ice controversy, many physicians recommend the approach “if it feels good, do it.” In other words, if ice is helping, utilize ice therapy. If heat treatments seem to help, then utilize the heat treatments. Common sense should prevail, and either one should be used in moderation.

**PHYSICAL THERAPY**

Physical therapy is usually an ineffective and inefficient utilization of the health care system in the treatment of osteoarthritis. There is little that a therapist has to offer to make a patient with osteoarthritis feel better. Ultrasound is a method of delivering deep heat treatments that sometimes can be helpful. Instruction on how to safely perform strengthening exercises without over stressing joints can be useful. However, repetitive and prolonged visits to the physical therapy department are generally not necessary or indicated in the treatment of OA.

**WEIGHT REDUCTION**

Weight reduction is extremely beneficial in reducing symptoms, particularly in the osteoarthritic knee. For example, the simple act of getting up out of a chair without using chair arm rests puts over three times body weight across the knee joint. Thus, weight loss has a multiple effect on force reduction on the joint. However, weight reduction in the arthritic patient is difficult to achieve. It can sometimes be difficult to design a calorie-burning aerobic fitness program to aid in weight reduction that does not over stress arthritic joints. Proper nutrition and dieting is critical to any weight-reduction program.

**NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS)**

The class of drugs commonly known as NSAID’s has for many years been the cornerstone of medical management of osteoarthritis. It is important to note that NSAIDs are not disease altering. These drugs simply suppress the inflammatory response which results in the reduction of joint swelling and pain. They are particularly effective in the early stages of arthritis. They are much less effective in “bone-to-bone” severe end-stage OA. There are many effective drugs in this class. Ibuprofen, which needs to be taken on a three or four times a day dosage schedule is the prototype of this class. Many of the new NSAIDs can be taken at a less frequent dosage interval and are more convenient. However, there is no evidence that any one of these drugs in this class is more effective or stronger than the others. On an individual basis though, one patient might respond to one of the NSAIDs better than another. The most common complication from taking NSAIDs is gastrointestinal intolerance. Twenty percent of all patients taking NSAIDs developed symptoms of gastritis, indigestion or peptic ulcer disease. There is a 1 percent risk of an actual bleeding ulcer. NSAIDs also affect the platelet’s ability to clot blood. Rarely, NSAIDs can adversely affect other organs such as the kidney and liver.

The “cox-2 inhibitors” are a newer class of NSAIDs. Though no more potent than previous NSAIDs, they do have a lower risk of gastrointestinal complications. Newer concerns with this class include the increased risk of cardiovascular disease. As a result, Vioxx and Bextra were recently withdrawn from the market. Celebrex, another “cox-2 inhibitor” has to date not been shown to increase the risk of cardiovascular disease. More recent information also questions the cardiovascular safety of older generation NSAID’s such as naproxen (Naprosyn, Aleve, etc.). Data regarding the cardiovascular risk profile of the older generation NSAIDs is still being evaluated, and it may take years before there is any certainty as to the exact nature of risks involved. It is necessary for each patient to balance the anti-inflammatory benefits of NSAID use versus the risk of gastrointestinal and cardiovascular complications. In many cases, consultation with an internist, family physician or cardiologist is prudent.
Over-the-counter alternatives to prescription NSAID are popular and effective. These include naproxen and ibuprofen. Naproxen (Aleve and others) has a more convenient dosage schedule than ibuprofen and thus is recommended by many physicians as the NSAID of first choice for most patients. Two of the 220 mg naproxen tablets taken twice daily with food is nearly as effective as any prescription NSAID available.

**ORAL STEROIDS (CORTISONE)**

Oral steroid preparations are generally more effective than NSAIDs in suppressing the inflammation, swelling and pain of osteoarthritis. Steroid products are generically referred to as “cortisone”. There are several available drugs, but prednisone is the most commonly used. In general, oral steroids are effective in mild to moderate osteoarthritis, but again are ineffective in severe end-stage disease. Steroids are often given in the form of a tapering dosepak. Steroids should not be taken over the long term unless absolutely necessary because of adverse effects on many organ systems of the body. Side effects are few when taken over a short duration. Patients with very sensitive stomachs can develop symptoms of ulcer disease, but this is uncommon when administered via a six day tapering dose pack. A flushed or restless feeling sometimes is noticed, but this resolves upon completion of the medication. Diabetics need to carefully watch their blood glucose, as steroids will cause an elevation in blood glucose. Steroids are safe and very effective drugs when administered and used judiciously.

**INTRAMUSCULAR STEROID INJECTIONS**

Intramuscular (IM) steroid injections are available for patients who have difficulty with oral medications. In general, risks and benefits of IM injections are similar to those of the oral route, and there is no special advantage to this route of administration.

**INTRA-ARTICULAR INJECTIONS**

Injection of steroids into an affected joint can be an extremely effective short-term means of treating an acutely inflamed and symptomatic osteoarthritic joint. Intra-articular steroid injection will suppress inflammation and help to resolve swelling and soreness. This leads to less joint pain and improved function. The knee is one of the most commonly injected joints. When properly performed, this is a relatively painless injection. It can be done in the office setting. The hip is injected less commonly. It must be injected under fluoroscopy in a hospital x-ray department suite. The spine can be injected with steroids via an epidural block. Epidural blocks are most commonly performed by the anesthesia team, spine specialist or pain management physician at the hospital or in a special clinic. Intra-articular steroid injections are somewhat effective even in relatively moderate to severe disease. Even this potent form of treatment, however, is ineffective in severe end-stage disease. Intra-articular steroid injections can only be administered on three to four occasions over a 12 to 18 month period. Excessive use of intra-articular injections can lead to an acceleration of the arthritic process. A steroid injection into the joint can raise the blood sugar in a diabetic. In general, the intra-articular steroid injection is an excellent and potent therapy for treating the osteoarthritic joint that should not be ignored. It can be under utilized to a patient’s detriment, but it can also be abused and over utilized as well. As in many aspects of medicine, judicious use should be employed.

**JOINT ASPIRATION**

Aspirating or draining the joint of fluid without some other adjunctive therapy is an ineffective way of treating arthritis. If the fluid is simply aspirated, it will return within a few short hours. An aspiration is maximally effective when combined with an intra-articular steroid
injection. The two primary indications for aspiration are 1) to send the joint fluid to the laboratory for diagnosis (synovial or joint fluid is nondiagnostic in osteoarthritis) or 2) to relieve pressure on a tensely swollen joint. Mild accumulation of fluid in the joint can be handled via an injection of steroid only, without the need for aspiration. In general, aspirating and injecting the joint is a slightly more painful experience for a patient than a simple injection only.

**VISCO SUPPLEMENTATION (HYALURONIC ACID JOINT INJECTION)**

A relatively new treatment of osteoarthritis is the injection of hyaluronate into a joint. Commercial hyaluronate is a high molecular weight relative of the normal hyaluronic acid found in normal joint fluid. It is felt that injection of exogenous hyaluronate into the joint will improve lubrication and mechanical joint function. This form of treatment seems to be safe with few complications. Effectiveness is controversial, and there are conflicting studies regarding the success rate of this form of treatment. If effective, beneficial results start 2 to 3 weeks after treatment is initiated and may last for 12 to 26 weeks or longer. Major disadvantages include the cost (approximately $500 for the series) and thus the need for acquiring insurance approval prior to treatment; the inconvenience of returning for three weekly visits to the M.D.’s office for injection; and the fact that the benefits when present are short-term only. Studies have demonstrated that visco supplementation injections are approximately as effective as intra-articular steroid injections. Commercial products available include Synvisc, Supartz and Hyalgan. No proof exists that one product is more effective than another.

**GLUCOSAMINE AND CHONDROITIN SULFATE**

Glucosamine and chondroitin sulfate are two over-the-counter preparations that have become popular recently in lay publications. Glucosamine is a precursor of a substance found in the matrix of normal articular cartilage. In theory, it works by helping the cartilage cells (chondrocytes) synthesize additional healthy cartilage matrix. Chondroitin sulfate is also a substance found in the matrix of healthy articular cartilage. It is theorized that chondroitin sulfate may help inhibit the breakdown of articular cartilage. Advantages of glucosamine and chondroitin sulfate include its convenience (it is available over the counter), it’s safety (few if any side effects), and it’s cost effectiveness (relatively inexpensive). The major drawback is that few studies have conclusively proven the effectiveness of these preparations.

**SURGICAL TREATMENT**

There is no surgical cure for arthritis. A variety of surgical strategies can be employed, depending on the joint involved and stage of the disease. These include:

1. **Arthroscopic Washout:** Arthroscopic washing out of a joint can sometimes help the joint over the short term. However, this does not “cure” the arthritis and should be considered only when other measures have failed.

2. **Arthroscopic Chondroplasty:** This is commonly known as shaving or smoothing of the joint. It can be performed via a variety of surgical techniques including shaving, cauterizing or use of the laser. Again, it can sometimes help resolve acute symptoms unresponsive to other more conservative measures, but it is not curative. It is ineffective in severe osteoarthritis.

3. **Removal of Joint Spurs:** Though intuitively this sounds attractive, it seldom improves a patient’s condition. An exception to this is the great toe metatarsophalangeal joint, where spur removal sometimes can reduce soft tissue impingement.
4. **Cartilage Transplants:** There are new techniques available for cartilage transplantations in young patients with small lesions and isolated to certain areas of the knee joint. Only a very small percentage of patients have disease amenable to this type treatment. This form of treatment is expensive, often not covered by insurance, and is still regarded as unproven and experimental.

5. **Fusion:** Certain joints can be fused without significantly adversely affecting function. Fusion of the joint eliminates pain, and obviously motion at that joint as well.

6. **Joint Replacement Surgery:** Joint replacement surgery, particularly of the hip and knee and to some extent the shoulder, is one of the great success stories in the last few decades of orthopedic care. In the appropriate clinical setting, it can produce dramatic benefits to the patient.

**CONCLUSION**

Osteoarthritis is an extremely common affliction of an aging patient population. It results in the thinning or loss of the articular cartilage surface of the joint. It is manifest by characteristic x-ray changes and a clinical picture consisting of joint swelling and soreness and joint stiffness. There is a no cure; though the conservative treatment modalities outlined above can be helpful in controlling symptoms. Ultimately, in end-stage disease, surgical measures sometimes must be considered.