LIVING WITH ARTHRITIS

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Arthritis, known as common cause of disability affects almost one person in every family and actually refers to a group of over 100 different conditions. Osteoarthritis and Rheumatoid Arthritis (RA) are two commonest types of the diseases. These are not only found in humans but also throughout the animal kingdom. Some skeletons of prehistoric animals displayed in museums show signs of an arthriric condition. It is estimated that about one per cent of the global population suffers from one or the other types of arthritis affecting some of the 264 synovial joints present in the human system. Arthritis is the name given to a disease involving principally the joints and is characterised by pain, stiffness, swelling and finally loss of function. In this disease the lining of the joints gets inflammed and can result in damage to its surface. The exact reason why the disease occurs is not known. Patients of arthritis may become so incapacitated that they are unable to perform even the most routine tasks. This incapacity combined with pain and deformity caused by disease and with inforced idleness and dependency often results in a sense of hopelessness and depression.

Osteoarthritis is the most common form of arthritis. Many factors which predispose the joint to osteoarthritic changes have been identified. These include ageing, wear and tear, mechanical derangement in joint, obesity, haemophilia, crystal deposition, genetic and environmental. It is an insidious, slowly advancing joint disorder commonly found in middle-aged and elderly individuals characterised by destruction of articular cartilage, overgrowth at joint margins and joint deformity which produce variable clinical disability of an affected joint. It is not wholly due to ageing of cartilage but represents a disequilibrium and disorganization of the process of degeneration and repair. Osteoarthritis is called primary when no known predisposing factor is present. Secondary osteoarthritis is differentiated from primary in that there is a clearly defined underlying condition such as trauma, metabolic disease or inflammatory arthritis contributing to its cause.

Some of the changes which occur at joint during genesis of arthritis are now well-recognised. Degeneration of articular cartilage is the hallmark of osteoarthritis. Degeneration involves softening of cartilage due to loss of mucopolysaccharide ground substance "chondroitin sulphate". Superficial layers of cartilage, often not always in areas of stress become fragmented and fibrillated. With joint motion, this fibrillated cartilage is lost thereby exposing underlying bone. With the loss of full thickness of articular cartilage, characteristic changes take place in the

underlying bone, i.e., subchondral bone. The denuded bone is now exposed to the erosive action of opposing joint surfaces. The exposed bone becomes thickened in response to increased stress and frictional effects of joint motions which also produce a polishing effect giving a smooth ivory-like appearance to the bony surface. This is known as 'eburnation'. The progressive loss of cartilage is often associated with proliferation of new bone and cartilage at the joint margins, resulting in spur formation. These series of changes cause remodeling of bone. The clinical presentation of osteoarthritis can be divided into early and late stages. The early stages are dominated by pain on motion and stiffness, night pain and responsiveness to anti-inflammatory medication. The pain is an early symptom and results from distortion of joint capsule plus inflammatory infiltration of the capsular tissues and direct pressure upon exposed subchondral bone. Initial stiffness is probably the consequence of two roughened cartilage bearing surfaces moving one on another. The late stages are dominated by joint instability, predominance of pain at rest accentuated on weight bearing, and failure of responsiveness to anti-inflammatory agents. As this condition progresses, limitation of movement increases often more in one particular direction than another, resulting in fixed deformity. It becomes difficult to sleep on the affected side. Gait disturbance of variable severity can also be observed.

Rheumatoid Arthritis (RA) is the other commonest type of arthritis. It is a result of interaction of different set of factors. Although the disease is not genetically inherited, some inherited molecules on the surface of cells increase the likelihood of one getting the disease. The disease is not contagious but a viral or bacterial infection can act as a trigger to start the disease process in susceptible individuals. Once the process is triggered off, antibodies and immune cells that are defend against infection, turn against the body's own tissues and damage it. The brunt of the damage is borne by joints. Rheumatoid Arthritis that starts before the age of 16 years is called juvenile rheumatoid arthritis. Women are more likely to get the disease as compared to men. Since the type of arthritis that occurs in RA may resemble the arthritis of several diseases, it may take a while before the diagnosis is settled. Most individuals with RA have an antibody called rheumatoid factor. It is important to realize that this is not found in every patient with RA and that it can occur in a small percentage of normal individuals and also patients with some other diseases.

The diagnosis of arthritis is made on the basis of clinical presentation, X-rays and some blood tests. However, none of the conventional techniques for diagnosis of arthritis conclusively tells about the progression of the disease. Options such as CT and MRI scan will yield comprehensive information, but these diagnostic procedures are too expensive to be used routinely. Radionuclide imaging of the affected joint can yield information with respect to the extent of damage caused to the cartilage and bone by the intruding synovium. Painful joints are treated by non-surgical and surgical procedures. Non-surgical procedures include rest, physiotherapy, reduction in body weight, use of ambulatory aids and medicines. Rest is needed if the inflammation in joint is severe. However, if too much rest is given the joint may become stiff and muscles around them become weak. With a right balance between rest

and exercise, most patients can lead an active life. Ambulatory aids such as stick, walker or crutch avoid full weight bearing on the concerned joint and helps to alleviate symptoms of arthritis. In addition, use of shoe-raise to compensate for true or apparent shortening improves the gait of arthritic patients. Immobilisation with the joint with traction in the acute inflammatory phase of arthritic process reduces strain on the joint. Utilisation of appropriate splints and braces are also recommended for the patients. Battery of analgesic/anti-inflammatory/anti-pyretic medicines are recommended for getting relief. These medicines slow down the progress of disease by their lysosomla-stabilising and anti-prostaglandin effects on the articular cartilage. Some of them bring about immunosuppression, immunostimulation, immunomodulation decrease pain and swelling and improve joint mobility. Slow active anti-rheumatic drugs or anti–rheumatic drugs act at a more basic level in the pathway that leads to disease and do not start working soon after they are administered. They act slowly taking from weeks to up to six months or so for their beneficial effects to appear. But none of them arrest the progression of disease. The treatment is economical but prolonged usage and frequent dose adjustments are required. Long term use of drugs is associated with side-effects. Recently, several new medicines including monoclonal anti-bodies are being tried in patients with advance disease. In general, three indicators for considering a surgical procedure include progressive and irreversible loss of joint functions, pain especially nocturnal pain and diminishing capacity to carry out activities of daily living independently. Surgical procedures include arthrodesis, arthroplasty, osteotomy, patelletomy and total joint replacement. But the post-operative problems of immobilisation such as deep vein thrombosis, chest infection, urinary stasis and pressure source are constant source of worry when surgical treatment of weight bearing joint is undertaken.

Radiation synovectomy offers a viable and attractive alternative to surgical procedures for the effective management of arthritis. It involves intra-articular injection of a beta-emitting radionuclide of appropriate nuclear, chemical and biochemical characteristics, into the affected synovial joint to control the excessive proliferation of synoviocytes. For example, yttrium 90 for knee joint or rhenium 186 for shoulder, elbow, wrist and hip joint and erbium 169 for small joints such as metacarpophalangeal joint or tarsel joints. The mechanism of action is by beta-emission which destroys the infected hypertrophied synovium causing shrinkage of synovium thereby improving the painful condition and restricted movement of the joint. However, the radiation exposure to healthy organs due to radionuclide escaping from injected joint cavity was a matter of concern. The current approach is to make the particles of appropriate size and then label them with the radionuclide of choice thereby reducing their probability of escape from cavity. Development of colloidal particles such as silicates, citrates and hydroxyoxides of the isotope ^{90}Y and ^{169}Er has reduced the incidence of leakage from the joint.

Thanks to the modern research in the field of nuclear medicine for developing the new procedure called 'radiation synovectomy' for removing the inflammed lining of the joint without conventional surgery. Conventional surgery is expensive, needs hospitalisation and involves long

convalescent period. Radiation synovectomy is cheap and does not require any indoor admission. It has many other advantages over surgical procedures, e.g., it is a minor intervention, possible in inoperable patients, without side-effects, simultaneous treatment of multiple joints is feasible or at short intervals and repetition is possible. Contradictions are children, pregnancy, destruction of articular cartilage and severe malrotation of knee joint. Radiation synovectomy is invasive and relief generally lasts for three to four years. In case of recurrence, the treatment can be repeated. The radiopharmaceutical division of BARC has taken up a programme for development of radio-synovectomy agents. The radio-isotopes of choice are the ones which can be easily produced in large quantities in medium flux reactor, e.g. Holmium 166. This isotope is prepared at Dhruva reactor and made available to large number of patients at reasonable rate. The biological evaluation of labeled Holmium hydroxy-apatite particles (^{166}HO-HA) was done at Radiation Medicine Centre at Ruby Hall Clinic, Pune. Earlier, this centre has been practicing radiation synovectomy using imported products. The centre has demonstrated that the product from Dhruva reactor could be used as replacement for the expensive commercial synovectomy agents. The indigenous availability of this product for radiation synovectomy would be an important milestone and make this treatment more widely available at affordable cost to the needy patients of India. This product is earmarked for regular deployment on a large scale through the Board of Radiation and Isotope Technology (BRIT).