Artificial Intervertebral Discs

Vertebrae are complex structures that develop from several centuries of ossification. The parts are the neural, hemal arches and spines, and the interneural and interhemal arches and spines. There are 24 vertebrae in the spine; the first seven (C1 – C7) are cervical ("neck"), these vertebrae support the head. The next 12 are thoracic vertebrae, which articulate with twelve pairs of ribs; the last 5 are lumbar vertebrae.

Discs are the cartilage that lies between the bony vertebral bodies of the spin. These areas are considered joints being motion occurs there. As a natural part of the aging process, discs lose their water content and degenerate, causing tears to occur in the outer lining of the disc (the annulus). The annulus has nerve fibers while the center of the disc does not. Therefore a tear in the outer annulus is quite painful.

One of the newest ways of treating degenerative disc disease is artificial disc replacement. The prosthetic disc replaces the injured disc, helping to relieve chronic back pain. The disc is made of the same material used in artificial hips and knees. Replacing the disc with an artificial one has two main benefits. Motion is maintained and the patient will not feel their range of motion is restricted and adjacent segment disease will not occur. Right now artificial discs are mainly used to replace cervical discs.

The idea of spinal disc replacement is not new. It was first attempted 40 years ago. At that time, stainless steel balls were implanted into the disc spaces of more than 100 patients. These efforts were followed by more than a decade of research on the degenerative processes of the spine, spinal biomechanics and biomaterials before serious efforts to produce an artificial disc resumed. The Bryan cervical disc prosthesis represents a state-of-the-art disc prosthesis, although several types are now available.

The Bryan Cervical Disc System is a composite-type artificial disc designed with a low friction, wear resistant, elastic nucleus with two anatomically shaped metal plates. A flexible membrane forms a sealed space and contains a lubricant to reduce friction and wear and tear. The implant allows for normal range of motion and comes in five sizes. So far the Bryan cervical disc is available in Australia, Europe and South Africa. It is currently part of a randomized 12-center Food and Drug Administration (FDA) trial throughout the United States and should be available outside the trial in the United States in a few years.

There are other artificial replacement discs other than the Bryan. One of them is the Prestige. The Prestige cervical disc system is another type of artificial disc. It has been available for more than 10 years. It consists entirely of stainless steel or titanium. It is a ball and socket construct. The artificial disc is screwed into place and to date can only be used for single-level disc disease. This implant is less popular than the Bryan Cervical Disc System and is not available in the United States or Australia. The insertion is less meticulous than the Bryan disc, but the fundamental goals are identical.