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Percutaneous intradiscal interventions

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Discogenic low back pain resulting from internal disc disruption can be severely disabling, clinically challenging, and expensive to treat. Previously, when conservative care had been exhausted, open surgical interventions such as spinal fusion or artificial disc replacement was the only treatment option for these patients. Early percutaneous procedures showed conclusively that these interventions effectively relieve pain for appropriate patients, but had some limitations, and so over the years a variety of more advanced techniques have been developed. Fluoroscopic guided percutaneous intradiscal procedures such as disc decompression, nucleotomy, intra-discal electro thermal therapy (IDET), nucleoplasty, intradiscal radiofrequency (RF), and biaculoplasty are interventional and minimally-invasive techniques performed in the outpatient setting, offers an intermediate intervention between conservative care and surgery. For appropriately selected patients, these percutaneous interventions can help relieve back and leg pain symptoms, including sciatica and radiculopathy and even pure axial pain caused by a central focal protrusion or central bulge of the disc. This group of patients has failed conservative therapy consisting of a trial of simple analgesics, NSAIDs, bed rest, and epidural steroids. Some pain specialists also recommend that a trial of transforaminal epidural steroid nerve blocks should be attempted before these percutaneous intradiscal interventions. To optimize patient selection, the ideal candidate for these procedures should have magnetic resonance imaging (MRI), diskography, and electromyographic (EMG) changes that correlate with the patient's radicular pain pattern. During all these procedures, an instrument is introduced under fluoroscopic guidance through a needle and placed into the center of the disc where a series of channels are created to remove tissue from the nucleus or to shrinkage it. Both tissue removal from the nucleus and volume reduction of nucleus act to decompress the disc and relieve the pressure exerted by the disc on the nearby nerve root. As pressure is relieved, pain is reduced, consistent with the clinical results of earlier percutaneous intradiscal interventions. There is little tissue trauma and recovery times may be improved in many patients. Complications of percutaneous intradiscal interventions directly related to using the device are generally self-limited.

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Disc regeneration: A glimpse of the novel interventional approaches

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The normal intervertebral disc clinically acts to support and dissipate loads while permitting multiaxial motions of the spine. Its demanding mechanical function is provided by a well-defined microstructural organization and biochemical composition. Intervertebral disc degeneration is a complex process that disrupts this well-defined organization and biochemical balance. One hallmark of intervertebral disc degeneration is the loss of proteoglycan and water in the Nucleus Palposus. Because of the central role of proteoglycans in the function of the intervertebral disc, restoration of normal proteoglycan production may be critical. Many different biological and interventional strategies have been developed, including the use of cells, scaffolds, and molecules. The molecules used to treat disc degeneration include anticatabolics such as anti IL-1, TNF agents and growth factors or its stimulants, which may influence the cell proliferation rate and phenotypic expression of the cells. Delivery of the molecules may include direct injection into the disc and also *in vivo* and *ex vivo* gene therapy using a viral vector. Autologous or allograft reinsertion, injection and transplantation of Nucleus Palposus cells, and stem cells therapy are methods of use of cells for disc regeneration. The purpose of a cellular scaffold is to provide an optimal environment for cellular migration and proliferation that allows maintaining the appropriate phenotype. Collagen is a physiological biomolecular scaffold and hyaluronan acts as an anchor for aggrecan retention by promoting proteoglycan aggregate formation.

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