Bone Graft

A Patient's Guide to Bone Grafts

A basic component of any spinal fusion is the bone graft. Bone grafting is used for many types of orthopedic procedures that require bone to heal. Bone grafting is used in two main ways during orthopedic procedures: 1) to stimulate the bone to heal, and 2) to provide support to the skeleton by filling in gaps between two bones.

The most common use of bone graft is to stimulate the healing of bone. The bone graft is used similar to "fertilizer" that stimulates the bone to heal and speeds up the process. When bone tissue is crushed into powder and placed around a fracture or a fusion site, there are chemicals in the bone that stimulate the bone to heal. If the bone is taken from the person's own body, there may also be living bone cells (called osteocytes) that survive being transferred to the new location and continue to go about their business of making new bone. Even bone taken from someone else will stimulate bone to heal. Although, bone taken from the same person may be better because of the possibility of the bone graft having remaining live bone cells during the transfer.

The second way that bone graft is used is for structure. Rather than crush the bone into fine pieces, larger pieces of bone are used to fill a gap between two bones. For example, if the surgeon removes a vertebra or disc, and has a gap to fill, he may place a chunk of bone graft into the space. Because bone is rigid, it will hold the bones apart while the body grows to the chunk of bone graft at either end. Over time, the entire piece of bone that was grafted will be "remodeled" and replaced by the body with new bone. How long this takes depends on how big a piece of bone was used. It is a slow process that may take years.

Bone taken from your own body is called autograft. Bone graft taken from someone else is called allograft. Allograft is usually removed from organ donors and placed in bone banks. The bone bank follows procedures intended to sterilize the bone graft and performs tests on the bone for diseases such as hepatitis and AIDS (just like a blood bank). The bone bank then sells the allograft to the hospital that performs your surgery. The cost will show up on your hospital bill.

An allograft can come from many types of bones in many different forms, but because it is not taken from the patient, it does not contain any living cells and has fewer chemicals to stimulate growth of new bone. The disadvantage of an allograft is that it does not always heal as well or as
quickly as an autograft. However, a bone-growing protein can be added to the site to make up for the lack in the bone graft. The advantage is that the patient does not have to donate the bone graft, so the surgery is shorter, and there may be less postoperative pain. The allograft also carries a risk of transferring infectious diseases, although it is rigidly tested.

Allograft is very useful when the operation will require more bone graft than your own body can supply. Some major spine fusions need a lot of bone graft and the surgeon may mix allograft with autograft. Some surgeries need large pieces of structural bone graft and it would cause a problem in the area where the bone was removed if it were taken from your own body.

There has been a great deal of research to design bone graft substitutes, chemicals, and devices that can stimulate the bone to fuse and grow together. Electrical current has been known for some time to stimulate bone to grow, so many surgeons use electrical stimulation devices during the first weeks of surgery to speed up a fusion. Artificial bone graft materials have been developed. Sea Coral, harvested from oceans, has actually been used as the basis for a structural bone replacement very successfully.

Demineralized Bone Matrix (DBM) is a type of allograft that is developed from cadaver bones in a bone bank. The bone has the calcium removed and can be turned into a putty, sheet, or gel. The material can then be added to a graft site to improve the fusion. Bone Morphogenic Protein (BMP) is an additional material that has been developed recently. BMP is a chemical that is added to bone graft and enhances bone growth when it is added to a fusion site.

Your surgeon will try to promote and speed the healing of your spinal fusion in a number of ways. The most common approach is to use your own bone whenever possible - it seems to be best at getting bone to heal. Allograft may be used to reduce your risks of problems with taking the bone graft from your body when more bone graft is needed than your body can supply.

Be sure to discuss the different options with your surgeon.