

Comparing methods of bone and cartilage grafting to help heal knee injuries

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Video Abstract

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Abstract

One of the biggest challenges in orthopedic surgery are deep osteochondral defects in the knee arising from adolescent osteochondritis dissecans or spontaneous osteonecrosis. Many surgical techniques can help manage these conditions, but those yielding the best results aren't clear. One promising option is transplantation of a patient's own bone tissue or cartilage cells to a site of injury. Researchers have now compared two such transplantation techniques – autologous bone grafting and the autologous chondrocyte implantation “sandwich” technique – to understand how to best help knee tissue heal. Both methods start much like how a dental cavity is treated. First, a high-speed bur is used to remove injured bone until healthy bone is reached. In autologous bone grafting, the defect is then packed with a patient's own bone chips, and the graft surface is secured with sutures if needed. These steps are performed while a tourniquet is applied to the leg. When the tourniquet is removed to restore blood flow, a “superclot” derived from bone marrow forms over the area as it heals. In the autologous chondrocyte implantation “sandwich” technique, no superclot forms. Instead, two membranes are placed over the graft, and lab-grown cartilage cells previously harvested from the patient are injected, or “sandwiched”, in between. These cells produce new cartilage, restoring the injured surface of the knee joint. The researchers compared patients treated with each method and found that the ACI sandwich technique produced superior outcomes across the board. The ABG group, for example, had graft survival rates of only 54 and 45% after 5 and 10 years, compared to 87% in the ACI sandwich group at both time points. The latter group also experienced significantly less pain and better knee function after surgery. Those in the ACI sandwich group also reported greater satisfaction with their outcomes, with 100% of the group stating they would choose the surgery again compared to 60% of the ABG group. Although the study did have limitations – for example, ethical concerns prevented the inclusion of an untreated control group – the results show that the ACI sandwich technique is an excellent option for rebuilding the knee in patients with joint injury involving both cartilage and bone.