similar percentages of each graft (66% bone-patellar tendon-bone autograft, 34% hamstring autograft). No differences were evident between the groups concerning concomitant procedures, including meniscus and cartilage repair, the type of anesthesia, or mechanism of injury. Significant differences were evident between the FNB and control groups in terms of tourniquet time (81.61 ± 17.9 vs 92.9 ± 17.2 min; p = .002), operative time (134.2 ± 29.4 vs 155.3 ± 45.1 min; p = .003), and anesthesia time (176.6 ± 29.6 vs 199.5 ± 43.0 min; p = .001).

Diminished isokinetic strength at 6 months, measured as fast and slow extension and fast and slow flexion, was more prevalent in patients who received FNB; these differences were significant for fast extension and for fast and slow flexion. Functional testing at 6 months did not reveal significant differences between the patient groups.

At 6 months, 90% of the patients in the control group and 68% of patients who received FNB following ACL reconstruction were cleared for a progressive return to pre-injury sports activities. The difference between the groups was significant (p = .002). Return to sports adjusted for surgical variables revealed significant associations with tourniquet time (OR, 5.6; p = .005), operative time (OR, 5.3; p = .003), and anesthesia time (OR, 6.7; p = .001).

The study findings indicate an association of FNB and significant isokinetic deficits in knee extension and flexion strength at 6 months postoperatively. In addition, the use of FNB delays patient return to sports activities at 6 months.

FNB During ACLR Delays Recovery of Quadriceps Muscle Strength

Written by Brian Hoyle

Robert A. Magnussen, MD, MPH, Wexner Medical Center, Ohio State University, Columbus, Ohio, USA, presented the findings of a randomized controlled trial on the effect of femoral nerve block (FNB) on quadriceps muscle strength and patient-reported outcomes following anterior cruciate ligament (ACL) reconstruction.

ACL reconstruction (ACLR) in athletes seeks to restore knee stability to withstand abrupt sports-related directional changes and pivoting. Postoperative rehabilitation often involves the restoration of quadriceps muscle strength to permit optimal sports performance and reduce the risk of re-injury. Blocking the function of the femoral nerve perioperatively can be done as a means of pain relief. Whether the approach hampers recovery of the quadriceps muscle is unclear [Atchabahian A et al. *Anesthesiology* 2001].

The trial addressed the hypotheses that perioperative FNB would result in significantly diminished strength in the lower quadriceps muscle 6 weeks after ACLR, as compared with preoperative muscle strength, and that postoperative improvements reported by patients would be delayed when FNB was used perioperatively.

Thirty patients who had experienced acute ACL injury and whose ACLR involved a hamstring autograft were randomly assigned to a group receiving a single injection of 20 mL of .5% ropivacaine using ultrasound guidance (n = 14) or a control group (n = 16) not receiving the FNB. Both groups underwent standard accelerated rehabilitation with weight bearing as tolerated and no braces. All patients were assessed preoperatively and at 12 weeks postoperatively using the patient-reported Knee Injury and Osteoarthritis Outcome Score (KOOS), and isokinetic strength was tested at 60° per second. A 6-week postoperative assessment for all patients included KOOS and isometric strength testing at 90° of flexion.

Patients in both groups were similar preoperatively in age, gender composition, height, weight, body mass index, limb symmetry, and patient-assessed activities of daily living (ADLs), pain, and symptoms (Table 1).

No surgical or nerve block complications were evident, and clinically detectable femoral nerve palsy was absent in all patients throughout the follow-up period. Comparisons prior to ACLR and 6 weeks after surgery revealed that quadriceps strength did not vary significantly between the left and right legs in the absence of FNB, whereas nerve block was associated with

Table 1. Preoperative Characteristics in Patient Groups

	No Block (n = 16)	Block (n = 14)	Significance
Age (years)	20.8 ± 9.1	23.9 ± 9.4	p = .35
Sex	7 male 9 female	4 male 10 female	p = .47
Height (m)	1.72 ± 0.08	1.73 ± 0.09	p = .69
Weight (kg)	74.4 ± 13.6	82.7 ± 16.1	p = .14
BMI (kg/m^2)	25.1 ± 3.9	27.6 ± 5.7	p = .16
Limb symmetry	0.77 ± 0.23	0.80 ± 0.14	p = .70
KOOS—ADL	87.6 ± 10.2	85.9 ± 13.1	p = .69
KOOS—pain	74.0 ± 11.0	75.6 ± 11.6	p = .69
KOOS—symptoms	61.4 ± 17.7	66.8 ± 17.1	p = .41

BMI=body mass index; KOOS=Knee Injury and Osteoarthritis Outcome Score.

significantly decreased quadriceps strength in the operative leg 6 weeks postoperatively ($p < .05$). By 12 weeks, quadriceps strength in both legs was similar in both patient groups.

Dr. Magnussen then addressed the association between FNB and KOOS values of ADL, pain, and symptoms. Both groups improved during the 12-week follow-up. The improvement was, however, more pronounced at 6 weeks in the absence of FNB. The change in KOOS ADL score at 6 weeks in the absence of block (6.5 ± 9.1) was greater than in the presence of block (.1 ± 11.3), but it was not significantly different ($p = .12$). Changes in KOOS pain and symptom values at 6 weeks postoperatively with no block (7.5 ± 9.0 and 10.1 ± 12.4, respectively) and with block (–1.1 ± 14.1 and –3.0 ± 21.3, respectively) were not significant ($p = .069$ and $p = .059$). Values of all assessed parameters at 12 weeks postoperatively were similar between groups.

FNB was associated with decreased quadriceps strength and an absence of patient-reported improvements at 6 weeks postoperatively. By 12 weeks, these deficits were not apparent. The long-term effects, if any, of quadriceps weakness in the early weeks following ACLR in patients receiving perioperative FNB remain unclear.

Tissue-Engineered Meniscus Scaffold Prevents Post-Meniscectomy Degenerative Changes

Written by Maria Vinall

Tissue-engineered load-sharing scaffolds offer the potential to preserve articular cartilage and prevent degenerative changes that occur after meniscectomy. Although meniscectomy can provide pain relief, total removal of the meniscus leads to articular cartilage damage and eventually osteoarthritis. Even so, each year an estimated 1.7 million meniscectomies are performed.

Charles J. Gatt, Jr, MD, Robert Wood Johnson Medical School, Rutgers, New Jersey, USA, described a C-shaped implant device that is being developed in his laboratory that mimics meniscal mechanics, serves as a scaffold for neomeniscus formation, and offers chondroprotection against degenerative arthritis. The hybrid device is composed of a fiber-reinforced collagen-proteoglycan sponge and resorbable, synthetic polymer fibers that are oriented in a similar design to the native meniscus and responds to both the compressive and tensile loads normally seen in the native meniscus (Figure 1).

Unlike allografts, with their many complications (age criteria, issues matching donor size, the length and high cost of the procedure, possibility of foreign body reaction, risk for disease transmission, and density of the graft leading to poor cellular infiltration and thus poor long-term results), tissue-engineered devices, although not approved by the US Food and Drug Administration, are not rejected by the body, demonstrate organized tissue ingrowth, and show long-term restoration of mechanical function.

Figure 1. Tissue-Engineered Meniscus Implant

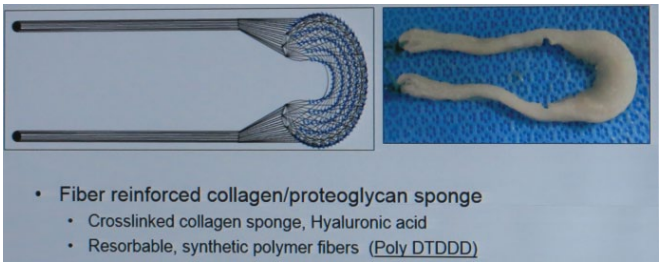

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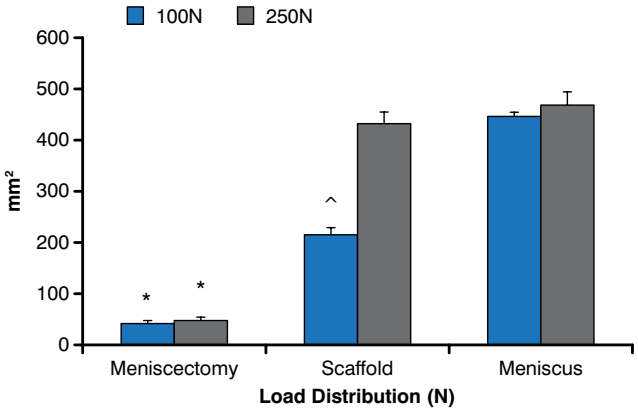
Figure 2. Load Distribution Without Meniscus, Scaffold, and Normal Meniscus



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When tested in a simulated ovine knee, the meniscectomy control has a very small contact area with relatively high pressures, while the scaffold looks very similar to the native meniscus (Figure 2).

After implantation into the joint space of a rabbit knee for 4 to 8 weeks, the excised scaffold showed a good amount of firm tissue ingrowth with little change to size or shape of the device. There was no evidence of swelling, redness, or signs of infection. Positive-cell infiltration and tissue deposition, the absence of excessive foreign body response, and no adverse joint effects suggest signs of good biocompatibility.